The Chemical Age

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Chemistry and Personalities

THE challenging address delivered by Dr. L. A. Jordan at Glasgow recently was referred to in THE CHEMICAL AGE last week. Dr. Jordan, like a famous forerunner who, jesting, asked what is truth, propounded conundrums and did not stay for an answer. Why, he asked, are chemical societies more quarrelsome than physical ones? Obviously because there are fewer members and less competition. Why have the physical societies been able to do without fuss and bother what the chemical societies have been talking about for years? Again, the answer is the same. Perhaps we might also add that the Institute of Physics really leads the profession of physicist, and since the physicist is a young profession none has yet arisen to do battle with the leader, seeking to play at King of the Castle. Why, again asks Dr. Jordan, is chemistry the most conservative of the sciences? Is it? If one should agree with Dr. Jordan that it is, then we would suggest that its seeming conservatism is due to the tide of major discovery in the field of pure chemistry running less strongly than in some of the newer sciences. We prepare new substances and put them to new and striking uses, but the great fundamentals of our science are apparently better known, or more generally known, to us than are the physical facts of the universe. And is not this, too, the answer to Dr. Jordan's last question: Why is it that so much of modern chemistry is being expounded by physicists? We reiterate here what we have said on past occasions, that comparatively few really useful industrial chemists can live by chemistry alone; physics and mathematics are at least as important. That is why we should like to see the universities insist that no one who proposes to enter industry should read for honours in chemistry until he has taken a pass degree in the three subjects. Professor Armstrong's letter in THE CHEMICAL AGE of November 21 shows how vital is physics to discovery in chemistry.

This, however, is by the way. The greatest value of Dr. Jordan's address lies, to our mind, in his insistence upon better organisation of the profession so that never again can situations like the recent Poisons Act imbroglio recur. We quite agree with our correspondent "Technologist" (THE CHEMICAL AGE, November 14) that one must draw the line somewhere, but even mere "catchers of precipitates" must live, and room should be found for them somewhere in any really representative organisation. It is necessary that a really representative body should safeguard the interests of all, but it is not necessary that all should have the same interests. The fault of chemistry as a profession for the ambitious is that unless he is "lucky" he cannot continue in the laboratory for more than about ten years, because the salary that one can afford to pay for laboratory work is severely limited. Lucky ones become chiefs with four-figure salaries. "Lucky?" Yes, for whilst no man can hold such a position without real ability, the number of those having realiability who can secure such positions is limited. In Dr. Jordan's phrase: "If a chemist has the ability to work out a few tricks he can make a name for himself. Tricks bring prestige—no tricks . . . obscurity." Is not part of our lack of success in organising because comparatively few who profess and call themselves chemists can afford to believe in chemistry as a profession?

Dr. Jordan said many things that in essence have been said in these columns before, and we call attention to some of them because his words must strike at the root of the unrest that exists among chemists to-day. The "profession" can do something for us collectively, but little individually; chemists are individuals, and must carve out their own careers as such. Thus Dr. Jordan, after painting a picture of the youth's belief in the B.Sc., says that any reward obtained by the student "will not be because of the B.Sc., but because the man is what he is . . . it is personality that counts." Again, "it is failure to appreciate the realities of the situation in time that leads to dissatisfied and disappointed men." Dr. Jordan is surprised by the number of men who do not realise that they represent invested capital and that the money required for their support is a first charge on the business. A man who is paid £500 a year, for example, may at 5 per cent. be capitalised at £10,000; someone has had to invest £10,000 so that he may work. A machine that cost £10,000 must be highly efficient to earn its keep; are chemists in their way equally efficient? That is the problem of the manager when confronted with demands for increased pay or shorter hours, and the fact that labour is synonymous with capital should prove an incentive for the human element to keep itself at least as efficient as a machine. Those who do not do so may fall out, and be cast on to the industrial scrap-heap. The whole matter can be put in a nutshell. The chemist is only of value in so far as he pulls his weight and is worth the sum at which his salary is capitalised. Organisation may help him to pull his weight and to that extent it is good. Organisation should enable him to be assessed at a fair capitalisation value, and to that extent it is good and sometimes necessary. Organisation allows him to speak with a corporate voice in the affairs of the nation and to that extent it is superlatively good. But in the upshot, the individual must work out his own salvation.

Notes and Comments

More Members of Chemical Bodies

REFERENCE was made by Mr. C. S. Garland, in presenting the report at the annual meeting of the British Association of Chemists last Saturday, to the fact that the Association was "one of the few chemical bodies whose membership was growing." We have, however, lately been revising the statistics relating to chemical organisations generally for THE CHEMICAL AGE Year Book and we find that most of them have registered an increase in membership during 1936. Be that as it may, the British Association of Chemists is still to be complimented upon a highly satisfactory report which records not only an increased membership, but a credit balance and a decrease in unemployment among its members. The Association concerns itself with the raising of the economic and professional status of all qualified chemists and the protection and promotion by corporate action of the economic welfare of its members, and it speaks well for the Association that more and more employers are applying to it for chemists and are thus showing a gradually increasing appreciation of the importance of the chemist in industry. It has an unemployment benefit fund, the disbursements from which have been below the normal average during the past twelve months. During the year the Association has given evidence before the committee, presided over by Sir William Beveridge, dealing with the raising of the salary limit for unemployment insurance, and the committee was so impressed with the Association's scheme that it published full details of it. It is hoped that if, as a result of the raising of the limit, more chemists are called upon to contribute to a scheme, the Association will be allowed to handle their affairs so that they receive proper remuneration during unemployment.

Half-Crown Gas Masks

NO sensible man insists on a Rolls Royce for a job that an Austin Seven can do admirably, observed Mr. J. Davidson Pratt, in referring to the civilian gas masks in his talk to the Pharmaceutical Society on Tuesday on the defence of the civil population against gas. He was dealing with the three different grades of respirators to be made by the Government as one of the defence measures—the general service respirator costing about £1, the civilian duty type costing about 10s., and the general civilian type at half a crown, and he took exception to our recent criticism of the half-crown type—a criticism based on the ground that very much protection could not be given at the low price at which that mask is to be made. Mr. Pratt points out that at 2s. 6d. each it will cost the taxpayer £4,000,000 to make provision for everyone, whereas if a general service respirator were provided the cost would be nearer £30,000,000. He emphasises that the different types have been specially designed for the purpose for which they are intended and are "based on many years' intensive scientific investigation." We venture to suggest, however, that, despite laboratory researches, their real value will not be proved until there is an actual raid by aircraft using poison gas as a weapon—which we hope will never occur—but meanwhile, as general civilians, we should feel far happier with at least a civilian duty respirator, even if we have to pay a few more millions for the privilege. Nevertheless, we still ask for information as to how long—in minutes—a general civilian type respirator will remain efficient in high concentrations of poison gas.

Too Much War Talk

THERE is far too much talk about the inevitability of war. The politicians do right to take necessary precautions. Where they go wrong—and nobody is more to blame than the aggressive campaigner for peace—is to create by their unnatural forebodings an atmosphere not far removed from panic. The European situation is admittedly difficult, but readers of history would find it hard to point to any period in the last hundred years when the national rivalries of the Continent were very much different from what they are to-day. There is no real analogy, as is too frequently sought to be drawn, between 1936 and 1914. The essential distinction between the two periods is the elaboration in the interval of an entirely new technique of diplomacy. Regret may very properly be felt for the scrapping of the old courtesies in favour of the blunt and rather crude approaches which the statesmen of different countries are making to each other to-day. Still, the fact remains that challenges which would have led directly to war under the old dispensation are now accepted as part of the international currency. There is nothing on the international horizon which, given wise statesmanship, need involve Great Britain in war, and the British business man, who has more to lose from an armed conflict than the politician, is showing the cooler head of the two.

Change of President

PROFESSOR E. C. C. BALY, of Liverpool University, has retired from the presidency of the British Association of Chemists after four years' strenuous service, and has been succeeded by Dr. J. Vargas Eyre. A typical representative of the professorial world, Professor Baly has distinguished himself as one of the best presidents the Association has yet had, and has done much to further the interests of the industrial side as well as the academic. It is, however, an unwritten rule in the Association to ring the changes between all sides of the chemical profession, and in Dr. Vargas Eyre it has chosen a worthy representative of the industrial side. Dr. Eyre is chief chemist of the Distillers Co., and if we may judge from his maiden presidential speech at the Association's annual dinner last week the members are certainly not likely to regret their choice. He believes in inculcating a better sense of professional attitude of mind among chemists, and he is determined to lose no opportunity of putting the profession where it should be. The Association has been described as the chemist's trade union, but under Dr. Eyre's leadership it is destined to be something more than that. Important developments in the organisation of the chemical profession are likely to be proposed during his term of office; whatever their effect may be in other directions he will see that the objects for which the Association has striven for the past nineteen years are adequately maintained.

British Association of Chemists

Annual Dinner and Meeting

THE nineteenth annual dinner of the British Association of Chemists was held at the Waldorf Hotel, London, on November 27. Professor E. C. C. BALY, the retiring president, took the chair, and among those present were Dr. J. Vargas Eyre (president-elect), Mr. S. Reginald Price, Miss Eleanor Rathbone, M.P., Sir Reginald Craddock, M.P., Col. W. Garforth, D.S.O. (Air Raid Precaution Department), Mr. C. S. Garland, Dr. E. F. Armstrong, F.R.S., Mr. W. A. Damon (Inspector under the Alkali Acts), and a large number of members and ladies.

Mr. S. REGINALD PRICE proposed "The President and the President-elect," and referring in the first place to Professor Baly, who would be retiring from the office on the following day after four years in that position, spoke of the valuable services which he had rendered to the Association and the keen interest he had taken in the welfare of the members.

Dr. J. Vargus Eyre, the newly elected President of the British Association of Chemists.

The New President

Referring to Dr. Vargas Eyre, the president-elect, he remarked that the Association liked to ring the changes a little as regards the activities of its presidents and the new president came from the industrial side as distinct from the academic side which was represented by Professor Baly. In asking the members to extend a cordial welcome to their new president, he said the Council knew it had selected an admirable man for the post, and in assuring Dr. Eyre of the full support of the members said he was satisfied that at the end of his term of office it would be found that the interests of the Association had been in as good hands as they had been with Professor Baly.

Professor BALY, responding first to the toast, said that his four years of office as president had been an extraodinarily interesting experience, but he asked for no thanks for what he had been able to do. He had always believed the Association had a great future and his period of office had confirmed that view. During the past few years there had been some interesting developments, and one of the most important was the Poisons Bill. The Association felt it was absolutely essential that it should be included in the schedule as one of the qualifying bodies. He was bound to admit that in regard to that matter the Association was not in nearly so strong a position as many of them might have thought, because he had been instructed by the Council during his first year of office to state that the Association did not claim to be a qualifying body.

Aim of the Association

The business of the Association was to look after the welfare, the salaries and conditions and everything connected with the personal life of its members. Qualification, of course, was a matter that had to be borne in mind in the sense that a man must be qualified before he could become a member of the Association, but that was a very different thing from claiming to be a qualifying body in the sense that the Institute of Chemistry was. Many of them felt, and he personally felt very strongly indeed, that when the Poisons Bill was introduced the Institute of Chemistry lost the greatest opportunity ever given to any body in this country. The Institute should have gone to the Association and said that the Institute should be given the right to deal with qualification and that everything else should be left to the Association as regards regulation of salaries, insurance, and everything relating to the material benefit of chemists in this country. Had the Institute done that it would have been possible to have accomplished, in one step, what was so necessary, viz., the closing of the profession. The Institute, however, missed that opportunity and the Association had been compelled to fight for itself. It was true they lost in the ordinary accepted sense of the term, but much had been gained, indeed, very much more than some of them appreciated at the moment. One thing that had been gained was that no chemist could practise in the manufacture of poisons unless he was qualified.

During his term of office he had tried to promote the interests of the Association, to persuade others to help in that work and generally to promote the interests and the prosperity of the members, all of which he considered to be the duty of a president, who should not merely be an office-bearer. Apart from the fact that it was necessary to have a head office in London, the great bulk of the work was done voluntarily and by the enthusiastic self-sacrifice of members of the Association, and he expressed the sincere appreciation of the council for the help so given.

Dr. J. VARGAS EYRE (president-elect), who also replied, said that as far as the future of the Association was concerned, it might not be an unfair thing to say he had joined the rebels and he felt he might say "Up the Rebels." If they looked things squarely in the face they must see there was something immediately wanting at the present time which the Association could very well do, and that was in inculcating a better sense of professional attitude of mind among chemists. There was sneaking into the profession—and he saw it particularly in the younger generation—almost a tradesmen's attitude of mind.

A Little Fighting Spirit

They looked at things from the point of view of how much they were going to have on Saturday night, and if they could not get that out of them very soon they would ruin the profession. If they did not get busy in that direction they would miss the opportunity of putting the profession of chemistry where it should be and where it was destined to be. He felt that a little fighting spirit in an organisation of this character would be all to the good. Personally, he was a little tired of those who put themselves on pedestals and wrangled as to prestige and position and so on. If the Association was to be of any service at all it was necessary to be active, and if he could be of any assistance to the Association, which was already a live one, he would be only too happy.

Professor BALY made a presentation to Mr. Reginald Price. It had been felt by some forty members who had served on the council that some expression of appreciation should be made of the great services Mr. Price had rendered ever since the Association was formed, and these members had each subscribed in order to present to him a bureau and an address of thanks, which they all had signed. The address referred to the services which Mr. Price had rendered to the Association, first as hon. secretary, then for twelve years chairman of the council, and for two years as president.

Mr. PRICE was given a cordial reception when he rose to express his thanks, which he did in a very few words.

Mr. A. J. C. COSBIE proposed "Our Guests," and coupling with it the names of Miss Rathbone, and Sir Reginald Craddock, Members of Parliament for the Northern Universities, thanked them for the assistance they had given the Association in Parliament, especially in connection with the Poisons Bill. He also extended a welcome to all the guests.

Miss ELEANOR RATHBONE, M.P., said she had been glad to do the little she had done in connection with the Poisons Bill because she felt the Association had claims which should be recognised as against those who had attempted to concentrate the right to manufacture poisons exclusively in the hands of one favoured body. Sir Reginald Craddock and herself had done what they could to help the Association and those it represented who did not have the voice in Parliament they would have had had they been coalminers, agriculturists, fishermen, textile workers and similar people. She only wished their efforts had been attended with more success, but she was glad to hear Professor Baly say he felt that some headway had been made in preventing the Poisons Bill from having the somewhat disastrous effect it was thought it might have upon the British Association of Chemists. She had great sympathy with a body which voiced its resistance to entire domination by officialdom, and she was sufficient of a free-trader, non-party though she was, and she was also a sufficient believer in private enterprise to believe that competition was a wholesome thing among industries, among nationalities and even among professional bodies, and whatever amalgamations might take place among various bodies she felt that in the present instance it should take place on the lines suggested by Professor Baly.

Col. W. GARFORTH replied in a very few words and the remainder of the evening was spent in dancing.

The Annual Meeting

The annual meeting was held on November 28, Professor Baly again presiding. The hon. treasurer's report showed a balance on the right side for the year of £130, as compared with a loss in the previous year due to special circumstances.

Mr. C. S. GARLAND, chairman of council, presented the report for the past year and pointed out that the membership of the Association continued to grow. The Association was one of the few chemical bodies whose membership was growing and had continued to grow, and he expressed the belief that ultimately the Association would embrace the whole of the profession. The junior members of the profession were realising more and more the importance of the Association's unemployment scheme, and it meant that any chemist who was a member had the assurance of some £14,000 capital and the credit of some 1,800 members of the Association behind him should he fall out of employment, and that he would have a reasonable time to look round for another position at a salary commensurate with his qualifications.

The small amount paid last year by way of unemployment benefit was an indication of the better state of employment, and also of the efforts of the excellent employment bureau of the Association, and he considered that the development of this scheme, the finances of which were reviewed every year and were absolutely and fundamentally sound, was one of the greatest things that had been done for the chemist, certainly within his knowledge of the profession. Referring to the Government Committee under the chairmanship of Sir William Beveridge, which had inquired into the whole position of employment in the country, Mr. Garland said the Association had expressed the view before that committee that if any alteration was to be made in the salary limit at which unemployment contributions should be made it should be such as to include all salaries, no matter how high. The report of the committee, however, recommended that the limit should be £400 per annum, and if as the result of that a considerable proportion of chemists found themselves called upon to contribute to the Government scheme, he hoped the Association would be allowed to handle the affairs of those chemists so that they received proper remuneration during unemployment. At the present time, the employment bureau of the Association not only handled applications from employers—and more and more employers were applying to the Association for employees—but it looked ahead and where new factories were being built inquiries were made as to the possible requirements for chemists, and the people responsible for those factories were made aware of the Association's bureau. In the matter of legal aid, the Association had been able to establish the principle that a chemist, unless he had a definite contract to the contrary, was entitled to three months' notice or three months' salary in the event of his employment being terminated.

The report of the council was approved, after a discussion as to the future of the Association's Journal in connection with which the council was instructed to appoint a small committee to investigate the whole position, and to report, with a view to improving the journal.

The Unemployment Committee

The report of the unemployment committee was then presented, it being pointed out that payments to members last year amounted to only £495. It was also mentioned that the Beveridge committee had included in its report an excellent résumé of the Association's unemployment scheme.

The unemployment committee's report was adopted, although there was some criticism of the basis upon which it operates. This criticism came from Birmingham, whose delegate said he would send in a detailed proposal to the council, his main objection being that at the present time a member who had paid into the fund for a large number of years—and had never drawn on it during that period—only received the same benefit, should he fall out of employment, as the member who had paid in for only twelve months. It was suggested to this member that the basis of his proposal to vary the benefit according to the amount paid in was unsound from an insurance point of view, but that his detailed views would be carefully considered.

The PRESIDENT then proposed the election of Dr. J. Vargas Eyre as president, and the proposition was carried with hearty acclamation.

The following vice-presidents were elected: Mr. William E. Kay, Mr. J. Bristow P. Harrison, Professor I. M. Heilbron, Professor A. G. Green, F.R.S., Sir James Colquhoun Irvine, and Dr. Paul Haas. The honorary officials were elected as follows, all of them at present holding office: Hon. Registrar, Professor E. C. C. Baly; hon. treasurer, W. H. Woodcock; hon. editor, H. T. Rhodes. The members of council, elected by the sections, are as follows: London, Miss W. Wright, G. T. Gurr, Capt. R. P. Porter; Liverpool, G. C. Riley, C. A. Wylie; Manchester, P. Chorley, F. Page Evans, A. Hill; Notts and Derby, R. J. Mann; Birmingham, A. Churchman; Scottish, R. W. Dunlop.

A Few Torches Lighted

Mr. C. S. GARLAND proposed a vote of thanks to the retiring president and remarked that during his term of office Professor Baly, who had been referred to as something of a firebrand, had lighted a few torches which would not go out for a very long time. At the same time he expressed satisfaction that Professor Baly was continuing to hold the office of hon. registrar, because there was no position in the Association which called for more care in the interest or the future of the Association inasmuch as it dealt with the admission of members of the Association. It would have been possible, said Mr. Garland, to have doubled or even trebled the membership of the Association had they relaxed in the slightest degree the stringent rules for admission which had been drawn up.

Professor BALY, acknowledging the vote of thanks, said he felt satisfaction in knowing that during his year of office certain difficulties had been overcome and had resulted in closer friendships which he hoped would continue for a long time.

The Workshop School of the Future

Learning by Doing

By PROFESSOR H. E. ARMSTRONG

DURING 70 years, I have studied to prepare a programme for schools that will systematically prepare the pupils to make fullest use of the methods of modern scientific discovery—to follow progress and be intelligent.

Our present indifference to the worthless character of the training our children receive is criminal. They learn to *understand* nothing; only the few that have genius get through and gradually become competent workers.

With rare exceptions, the Heads in charge of our schools are unable even to appreciate the conditions under which we now live, let alone to organise and administer a system to satisfy modern needs. Governing bodies are equally ignorant.

I have studied five headmasters of Christ's Hospital in succession. Not one of them has had any other desire than to train scholars. The gain of University distinctions, including athletics, always give rise to outbursts of enthusiasm from governing bodies. General efficiency is not in demand.

An Outstanding Realist

In the history of education, Thring of Uppingame alone stands out as a realist, as an advocate of *thinking in shape*.

The modernist, Sanderson of Oundle, an engineer, was no educationalist. He was carried away by the wonders of modern discovery. In addition, he had in him the missionary spirit, the conception of service; he sought by his own personal influence and enthusiasm to incite his boys to prepare themselves for public service. An individualist of the first order, he was in no way tied to the ordinary schools methods; he greatly improved the teaching of history and geography by giving it an elastic collective form. He was a constructive engineer, never a methodical scientific worker. The natural science in his school was therefore demonstrative, never an education in method. We cannot, in fact, look upon Sanderson as a model of the future headmaster.

The one headmaster I have known whom I regard as having had the main qualities of a realist teacher is the late C. M. Stuart, who became first headmaster of St. Dunstan's College, Catford, London, in 1889. A member of a remarkable family, cousin to James Stuart (who founded the manual training school at Cambridge), a man of great personal vigour. He took his degree in chemistry at Cambridge; he also studied in Germany.

My sons went to his school and I influenced him from the beginning. Engaged as he was in developing methods of instruction, he took an interest in all subjects; he had a hatred of every form of public examination and of the absurdly complicated system of Board of Education and County Council inspection of schools. His successors are gone back to the conventional school system of the day; once the best in the London area, now the school is no better than any other of its kind.

A Competent Engineer

Among Stuart's assistants was a peculiarly competent engineer, in charge of the manual instruction, which was carried to a high pitch of efficiency—T. S. Usherwood. When the time came to establish the Manual Training School at Christ's Hospital, I was wicked enough to tempt Usherwood away there, though I had no easy task to persuade the headmaster to take him rather than an academic person. The result was that Christ's Hospital long led the way in manual instruction. Usherwood was a man of remarkably broad outlook and culture.

When the school opened at Horsham in 1902, the natural science department was in charge of Charles E. Browne, who had worked with me at the Central Technical College. We had developed the elements of a course experimentally, in rough quarters, at Newgate Street, two years before leaving there.

The course during the first 20 years was original and entirely uninfluenced by external examinations. In later years, these have had a fatal effect in depressing the character of the teaching. The specialisation involved in preparing for higher outside examinations, especially for the London Intermediate, has been the most serious interference with systematic training in schools. The teachers are not competent to give higher instruction, the conditions are not suitable. The result is that what is gained in advancing the boy in his University course, especially in medicine, is more than counteracted by the loss of fundamental training. The present acknowledged lack of training in scientific method of medical men is an outcome of the system.

Securing Scholarships

Most of the higher schools are managed at present as if the sole object were to secure a few University Scholarships.

Here let me say that our schools are so behind the age entirely because of the failure of the Universities to consider and adjust their work to fit modern needs.

We have to alter our ideas—to consider what is education and to produce teachers that will give it. The present class, as a class, is grossly incapable—in mental outlook unable to enter into the spirit of our new age.

We are embarking upon an experiment. The first step will be to free the teachers, to give them complete *Lern und Lehrfreiheit*.

All outside examinations, to test individual proficiency, must be abolished—schools will take care of themselves. In days gone by the world was as well run as it is to-day—with the aid of men who had been trusted to make what best use they could of their opportunities.

Of course, the demand will be greeted with howls of execration—so many and widespread are the vested interests that are established The competitive instinct in headmasters will be greatly offended at being deprived of the chance of advertising supposed successes.

A Revolution Necessary

A revolution will be necessary in the method of teaching all subjects other than languages and to some extent mathematics —these and literary work will be the only class-room subjects.

We cannot continue to conduct our teaching as if we lived in the Middle Ages, when it served the purpose of the clerics alone. We must entirely throw over monastic control—a task of inconceivable difficulty.

We are more and more losing our chance of applying modern methods, so successful in all engineering enterprise, in the public behalf, owing to the influence of Oxford. Oxford over a long period, through the influence of its classical scholarships, has collected into its colleges classical talent of the most conservative type. Trained to scholarship, on purely literary lines, at school; the instruction continued at the University on similar lines; the student necessarily gains no knowledge of the world through direct inquiry. At Oxford, no one is qualified until he has read and memorised the authorities. The result has been to make Oxford sterile; it only produces talkers, not men trained in the method of using knowledge to gain knowledge—by experiment.

Unfortunately, these men become teachers. They are men for the most part of a peculiar type of mentality—made of *primitive or oldman stuff*, which only rarely is open to modification.

In their place we need to put men of the Baden-Powell type—men who will give direct disciplinary training in the art of doing. Those who have employed boys who have been trained as scouts have found them generally helpful, where those without the discipline have too often failed. The present school system of memorising is worthless as training—what is learnt is soon forgotten, because it has never been real.

Boys will spend most of the time as free learners but under conditions of rigid discipline. The paramount importance of discipline is ever to be held in mind.

While learning to read and write, children will equally be trained to look around them and learn how to observe, measure and describe everything they see—draw plans and maps in and outside the school. Such scouting must be made a habit and developed as a literary exercise. Baden-Powell's "Aid to Scouting" is one of the best textbooks for the teachers. In this he advises Scouts not merely to say that they came to a river but to give all particulars possible, how wide, etc.; he is always the exact teacher.

Sooner or later, the pupil must have made a complete plan, to scale, of the school and its surrounds—each for himself, not copied. This will involve no little field work—surveying, geological and geographical. Another class of study will be that of materials, especially those of the locality.

Following Baden-Powell's instruction, every different material will be characterised. The woods worked with in the carpenter's shop will be cut into regular pieces, so that the weights may be determined and contrasted with the volume. Flotation of ships can then be discussed.

Then metals will be similarly studied; the stones of the field, too. Gradually the habit of describing everything in definite terms will be established.

At an early stage, attention will have been directed to plants and animals and their growth. Garden and pot experiments will have been carried on, so that the life history of several typical plants will have been followed. The microscope will have been in constant use in these—indeed, in all work, whenever possible: to establish the habit of just looking at things.

Last will come studies of the nature of things in general, to lay secure foundations for the future study of the natural sciences. Here will come a systematic course of heuristic study.

Full notes must be taken as everything is done, from which a considered account may afterwards be written.

I have sketched little more than what I have done myself; no more than I know can be done. The boy will spend most of his time on his feet—not in a dull, confined classroom. In a measure the Dalton plan will be followed in this section of the work.

The present race of teachers cannot undertake such training—they are mere machines. The call is upon the Universities to produce competent men—their own system is as bad as that of the schools—without method.

No thought is given to education at present. We are tackling the lodging-house slums. The far more dangerous state of our school slums is unconsidered—the intellectually naked state of the pupils.

Corrosion in the Refrigerating Industry

A Symposium Held by the British Association of Refrigeration

THE internal corrosion in the refrigerant circuit of vapour refrigerating plants was the subject of a contribution by Mr. W. R. Sinclair, to the symposium on "Corrosion in the Refrigerating Industry," held by the British Association of Refrigeration at the Institute of Marine Engineers, on November 3. Mr. Sinclair dealt in an elementary manner with some aspects of internal corrosion of plants working on the vapour compression system, with the usual refrigerants, and its prevention. He pointed out that it is almost impossible entirely to eliminate water from new plants; the evaporating and condensing circuits have comparatively large surfaces and not infrequently are made in long runs of tubing built up into coils, forming ideal pockets for retaining fluids.

Dehydration

Dehydration by heating and blowing air through the coils is carried to the commercial limit, although there is probably always a little water left. Pipe connections also have to be opened up at some time or other, and air can scarcely be prevented from entering the various parts of the circuit under these conditions. By careful pumping out and production of a vacuum the moisture left is reduced as far as is practicable. Water may also enter a plant through the crankshaft gland of vertical machines, or the stuffing box or reciprocating compressors. It may be carried in by the piston rod, especially when working at low evaporating temperatures, when atmospheric moisture deposits on the rod.

Water is, however, frequently found in plants in such quantities as suggest a continual flow into the system. It is believed that such a result may occur through a minute pore in the metal. Such a hole is liable to rust up in time, and this agrees with the usual experience that the trouble due to water entering is found suddenly to cease.

Generally speaking, much more care is necessary to keep water out of plants which work with the newer refrigerants than those working with the older refrigerants. In seeking an explanation for the presence of water in plants the blame has not infrequently been laid at the door of the ammonia used to charge the system, but, provided that anhydrous ammonia is used, it would seem impossible for water to be formed in a plant from NH_3.

In all plants dehydrators have been used from time to time; such dehydrators may contain as the active substance a deliquescent material such as calcium chloride. It is preferable to avoid the use of materials which are liable to powder, such as calcium hydroxide. When working with organic refrigerants liable to produce acids, these dehydrators may contain also a basic substance such as calcium carbonate intended to neutralise acid in the system. Dehydrators are placed either in the gas circuit or in the liquid circuit, depending on circumstances. A mechanical form of dehydrator takes the form of a collector in the gas line; a most familiar instance of this is the so-called oil collector on the delivery side of a compressor which, however, may also catch water; such fittings are also frequently placed on the suction side where water can be caught and expelled by suitable means. Fortunately, by these means, trouble arising from water in plants is usually preventable; at times, however, the preventative method fails and corrosion is set up by the presence of water.

Production of Corrosive Fluid

It is clear that a mixture of water and SO_2 produces immediately a fluid which may be corrosive; indirectly an acid follows from water and methyl chloride. Speaking generally, all refrigerants based on the halogens break down and produce traces of acids in the presence of water. Hydrochloric acid, which is the more usual product (as, for example, hydrolysis of methyl chloride), is extremely active; its presence may cause coils, joints, etc., to puncture. Even stainless steel, of the ordinary $13\frac{1}{2}$ per cent. chromium type, is attacked, because the oxide to which it normally owes its resistance, and which is actually reinforced by ordinary acids,

is removed by hydrochloric acid. If the conditions are such that the corrosive liquor meets with copper or copper alloys then copper is dissolved, and if subsequently the liquid makes contact with a ferrous material, then by a process of electrolytic replacement (iron displacing copper from solution) copper is deposited. In the instance shown copper has deposited on cleaned polished surfaces in the compressor. The gudgeon pin was well coated with copper and so was the exterior of the piston. Even the steel rollers of one of the bearings have all been carefully coated. The appearance of the delivery valve and piston valve shows how the deposition has concentrated at those points where the gas velocity is highest, and where, consequently, the metal would probably be scoured most thoroughly. Commercial aluminium is particularly susceptible to the action of hydrochloric acid and cannot, therefore, be used for methyl chloride plants.

Ammonia Plants

In ammonia plants, provided one is working with a chemically pure refrigerant, no corrosion would occur, and it is believed that even copper or brass would be unattacked. However, as water and other impurities are usually present, copper and its alloys may not generally be used, and ferrous metals only are permissible. It is, however, a frequent practice to employ certain non-ferrous metals in plants; we have seen gudgeon pin bearing shells made of copper alloy and showing no signs of corrosion; these shells are, of course, well lubricated and normally only in contact with dry gas. Monel metal also, although it contains copper, is, it is stated, resistant to the action of ammoniacal liquors.

In the case of plants using ammonia, water may be said to be troublesome rather than dangerous with a flooded dry compression system. Where ammonia gas leaves a free surface of ammonia at a comparatively low velocity, water is not likely to be entrained and will, consequently, lodge in the refrigerator; it is clear that in order to remove the water and oil which collect, the refrigerators are preferably so formed that all impurities will gravitate to one point which can be readily drained. There are, however, a great many ammonia plants which work on direct expansion coils, in which the velocity of the gas is sufficient to prevent water lodging which, therefore, accompanies the stream of gas to the compressor.

A Frequent Sign of Corrosion

A frequent sign of corrosion, due to the presence of water, is rust on the delivery side of the compressor. Its occurrence is often associated with high delivery pipe temperatures, when bright surfaces would be cleared of their protective oil coating.

Rust is not so often found on the suction valves, although even here at times it is observed. The "weak liquor" which is found in plants when this condition obtains is normally contaminated by rust; oil which has been deteriorated and partly broken down by heat is usually also present. Other substances which may be present are calcium or sodium salts and rubber derivatives. If it were not for the coating of oil necessarily present on the internal surfaces of the plant, much more severe corrosion would be expected to take place.

Certain results occurring from water in plants is well shown on valves. An exhibit showed the seating of a disc valve made of mild steel in which the wearing surfaces are very thoroughly wasted. It seems likely that the majority of the wastage caused was due to erosion, but one would not be prepared to claim that no corrosion took place. The valve discs used in connection with this seat were of a chromium alloy, and these did not show any wear. Another exhibit showed another seating, and a close inspection of the seat revealed bright spots which were resistant to the erosive and corrosive effects. In recent years, however, the failure of valve seats has seldom occurred; as this has coincided with the use of harder alloy steels it would seem that erosion was the principal cause of the previous trouble. At the same time it must be borne in mind that these harder steels are usually more resistant to corrosion, as, for example, the high chromium or stainless steels. Seats are usually of nickel steel, and these also stand up well. Dry compression systems are, by their elimination of water from the suction circuit, probably more responsible than anything else for better conditions of operation of compressor valves.

It is usual to fit compressors with a filtering device on the suction side to prevent the entry of grit, etc.; as copper cannot be used with ammonia plants, steel is necessary, and steel gauze has been used as a filtering medium. This material is extremely liable to corrode with the result that the fine filtering medium provided may become ineffective. It has been found desirable, therefore, to produce filtering mediums of considerable structural strength in addition to providing fine filtration.

Some Aspects of Brine Corrosion

In a paper on "Some Aspects of Brine Corrosion," A. S. White, A.M.I.Chem.E., pointed out that brine corrosion can be minimised (1) by chemical treatment or additions to the brine, (2) by careful design, and (3) by the choice of suitable materials of construction.

When faced with the problem of installation of brine equipment the choice of suitable materials of construction is governed in the first place by corrosion resistance and in the second by cost. A survey of the literature shows very meagre data on the corrosion resistance of metals and alloys at refrigeration temperatures. The low temperatures themselves reduce corrosion rates and, presumably, because spectacular results cannot be shown, little has been published in this country. In the absence of low temperature tests room temperature tests will probably assist selection, but published data can be very misleading since conditions are rarely specified with great detail. Laboratory tests are notoriously unreliable, *e.g.*, one observer gives a corrosion figure for plain cast iron in aerated dilute sodium chloride at room temperature of 190 mg./sq. dm./day, while another observer, under ostensibly similar conditions, quotes 11.

Since chloride corrosion often manifests itself in pitting, which is the chief cause of breakdown, it is important to avoid conditions tending to produce local action, for instance, (*a*) the presence of anodic spots, such as scale or inclusions; (*b*) dissimilar metals in contact; (*c*) use of two phase alloys unless one phase is of small area and cathodic to the other, and (*d*) the use of joining methods tending to promote local salt concentration differences, such as rivets.

Corrosion Rates

Reviewing published and unpublished corrosion test results for the common engineering materials in brine, it is found that corrosion rates up to 10 to 15 mg./sq. dm./day can be expected.

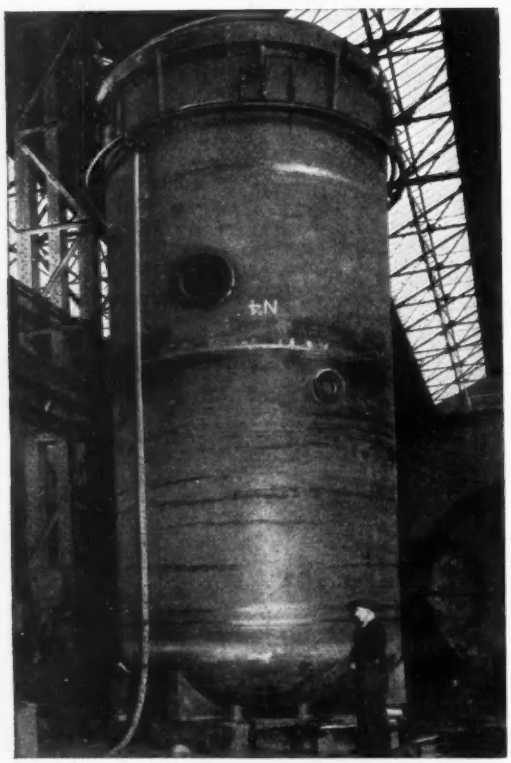
Such rates indicate a reasonable life in the absence of factors promoting pitting. With attention to design and *p*H adjustment of the brine, particularly with calcium chloride, the common engineering materials should give satisfactory service. It is recorded that wrought iron pipes have lasted upwards of thirty years in a case where the brine is regularly maintained in a slightly alkaline condition, and another case is known where mild steel brine coils have given satisfactory service over 18 years. In the latter installation ice trays of galvanised iron lasted ten years or so before waterside corrosion lead to their failure.

Other papers contributed to this symposium included "Experiments on the Treatment of Calcium Chloride Brine with Sodium Dichromate for the Prevention of Corrosion" (E. W. Colbeck, S. W. Craven and F. A. Fleming), "The Use of Tin in Refrigerating Equipment" (E. J. Daniels and D. J. Macnaughtan), "Some Consideration of Corrosion in Relation to the Use of Steel in Contact with Refrigeration Brines" (Dr. W. H. Hatfield, F.R.S.), and "Refrigeration and the Corrosion Problems in the Canning Industry" (T. N. Morris).

Steel Plant and Equipment in the Making

Chemical Engineering Students Visit London Engineering Works

A PARTY of students from the Chemical Engineering Department, University College, London, visited the works of G. A. Harvey and Co. (London), Ltd., Woodwich Road, S.E.7, on November 27, when a representative of THE CHEMICAL AGE joined them by special invitation. In their tour of the shops the fabrication of riveted and welded steel plate work for the chemical and allied industries was seen in various stages of progress. Sheet metal work as applied to the construction of air ducts, ventilators, cyclones, hoppers and dampers, was also seen, as well as the perforation of sheet metal, manufacture of wire work for machinery guards, and the making of steel cupboards and filing cabinets for office use.



One of four Evaporators constructed by G. H. Harvey and Co., (London), Ltd., to the order of Tate and Lyle Ltd., sugar refiners, are claimed to be the largest welded pressure vessels so far made to Llo d's Class (1) Code. Internal diameter 11ft. Total height 2oft. 9ins. Designed for a pressure of 250lb. per sq. in. on 11ft. diameter. The illustration shows the evaporator undergoing heat treatment of the circular seams.

In the main steel plate department, where plates up to a thickness of 1½ inches are dealt with, the visitors witnessed the hot pressing of a large hemispherical bottom for a pressure vessel. In this operation the skill shown by the operatives in removing the heated plate from the furnace and passing it, in a red-hot condition, beneath the press, was a matter of considerable interest to the visitors. In one corner of this building large steel plates are being turned to desired dimensions by means of lathes; in another part, steel plate was being bent to the correct radius for the sides of cylindrical tanks of notably large dimensions.

In the department concerned with the production of steel fittings for general office and works use, *i.e.*, steel partitions, adjustable racks and shelving, lockers, storage bins and filing cabinets, the visitors were able to follow all stages of manufacture from the primary pressing of the steel plate components, by way of the assembling bench, to the finished article, which was finally sprayed with enamel, prior to its passage through a drying store. Here it was noticed that the stoved equipment, with its hard wear and resistory enamelled surface, was ultimately polished by means of a very mild abrasive to remove the few slight irregularities which appeared on the surface of the enamel after being stoved.

At one end of the main engineering shop permission was given to examine the interior of a large heat treatment furnace, which has been installed by Harvey and Co. for the purpose of heat treating jobs up to 11 ft. by 11 ft. by 40 ft. long. Adjacent to this surface there was a portable X-ray apparatus which is used to examine all important welded work to detect any possible defects; the company also undertake the X-raying of welded work, up to a plate thickness of 3 inches, not necessarily executed in their works.

Gilled Tubes for Heating and Cooling

Among finished plant components the visitors were shown stacks of mild steel gilled tubes as used for refrigerating and heating purposes, and also for electrical equipment, *i.e.*, for the cooling of transformer oils at electrical grid stations. These " Harco " gilled tubes are extensively used as radiators and for heating and drying plant with air currents under forced draught; also for coolers and humidifying plant. These gilled tubes are of two patterns. The crimped gilled tube is supplied in sizes from ½ to 6 inches bore, in straight lengths up to 22 ft. long. The hot-shrunk tapered strip gilled tubes are a relatively new departure in this class of manufacture, and are claimed to be much superior to the ordinary crimped type of gill as wound on the tube in the cold condition.

In another section of the works the de-greasing of metal parts by means of trichlorethylene vapour was demonstrated. In these self-contained de-greasing tanks the vapour of trichlorethylene fills the tank up to a pre-determined height, by reason of the fact that the vapour is five times as heavy as air, and any escape of vapour from the full aperture at the open top of the tank is prevented by a very efficient water-cooled coil which is fixed to the tank walls and there condense any vapour which rises to their level.

On the occasion of this visit, the party was fortunate to see the largest trichlorethylene de-greasing plant ever made, or supplied to a user, in this country. This plant was under test prior to being installed at the Ford Motor Works at Dagenham, where it will be used for the task of de-greasing motor car cylinder blocks. The plant is so arranged that the metalwork to be de-greased will be carried into a semi-closed system by means of wire baskets, and in its passage through the plant it will be immersed in a bath of liquid trichlorethylene in place of trichlorethylene vapour, passage to a second compartment being arranged in order that a cleaner batch of the de-greasing solvent may remove the very last traces of grease which may adhere to the metal.

At the end of the visit the visitors were entertained to high tea, and a few words of welcome were spoken by Mr. E. B. Clarke, one of the directors of G. A. Harvey and Co. (London), Ltd., to which Professor Watson, of the Ramsay Laboratory of Chemical Engineering, responded on behalf of the students.

THERE are no match factories in Bolivia. The Government maintains a monopoly and grants the exclusive privilege of importation to a firm called " Compania de Fosforos de Bolivia " which imports Swedish and Russian matches.

Defence of the Civil Population Against Poison Gas

Gas Masks at Half-Crown Each

Mr. J. Davidson Pratt

ACCORDING to Mr. J. Davidson Pratt, general manager and secretary of the Association of British Chemical Manufacturers, lecturing before the Pharmaceutical Society on December 1, the instruction which the Government is now arranging for the general public should put the problem of gas attacks from the air in its proper perspective. In his opinion, proper organisation and instruction causes poison gas to lose much of its terror and it then becomes a less serious menace than an attack by high explosive and incendiary bombs.

Although a Geneva Protocol has been signed and ratified by a large number of nations prohibiting the use of gas in war, Mr. Pratt doubts whether we can rely implicity on this prohibition if war comes. Similar prohibitions in the last war were just scraps of paper to be torn up when it suited a particular belligerent. We have already before us the example of members of the League deliberately ignoring their obligations. In addition, there is evidence to prove that mustard gas has already been dropped from the air in bombs, and by spraying, and it would be foolish, if not suicidal, to place any reliance on the Geneva Protocol.

Chemical warfare employs either products which are in everyday use for industrial purposes or allied compounds which can be readily made with the plant in any well-developed chemical industry. In other words, the manufacture of chemical warfare agents can be readily improvised. The means of using these agents are also capable of easy improvisation. Almost any kind of container could be adapted for the dropping of poison gas from the air, so that a country with a powerful air force and a strong chemical industry has the means ready to hand for a rapidly improvised gas attack on the nerve centres of its enemy.

Types of Poison Gas

Gas also has a devastating effect on the morale of people. A country which has not prepared schemes of defence will be particularly vulnerable. While in the case of sea coast towns there is a possible danger of gas bombardment by naval guns, the real menace is from the aeroplane which can drop bombs of any size from a few ounces to a few tons. The bombs may be comparatively fragile and may liberate a variety of toxic agents which may act on the human body in various ways; gases like phosgene and chloropicrin attack the lungs; tear gases like ethyliodoacetate and chloracetophenone affect the eyes; organic arsenic compounds such as diphenylchloroarsine, diphenylcyanoarsine and diphenylamine arsenious chloride (phenarsarzine chloride) exert their irritant action on the breathing passages, while others of the vesicant or blistering type, such as mustard gas and Lewisite, will burn the skin and any other part of the human body with which they come in contact, whether as liquid or vapour. Protection for the whole body is therefore necessary in order to secure complete immunity from poison gases of the mustard gas and Lewisite types; for the other types, said Mr. Pratt, a gas mask protecting the lungs and eyes was adequate.

Liquids with low boiling points like phosgene, and toxic smokes, like the arsenicals, are liberated as clouds of gas or fine particles. These clouds are rapidly diluted and dissipated by the wind, and the area on which they are liberated may be free from gas after a comparatively short period, although the gas will tend to remain for some time in enclosed or restricted areas where there is little or no circulation of air. Chemical warfare agents of this type are described as "non-persistent" gases.

With liquids of high boiling point the reverse is the case. On the bursting of a bomb the high boiling liquid is scattered over the surrounding ground and objects, from which it slowly evaporates, contaminating the atmosphere with the vapour, and, in the case of vesicants, like mustard gas, it makes the affected ground and objects dangerous to touch until all of the liquid has evaporated, or until all of the liquid has been neutralised or destroyed. With mustard gas, when the contamination is heavy, it may take days (under cool weather conditions) before all the liquid has evaporated and before contaminated objects are safe to handle. Such gases are said to be "persistent."

The persistent gases leave a contaminated area which has to be cleansed or decontaminated before the area is safe, while the non-persistent gases do not. Both types may require the ventilation of confined spaces such as cellars and rooms, in which the gas or vapour cannot be readily dissipated by the wind.

In practice an enemy may be expected to use high explosive and incendiary bombs at the same time. Protection against a direct hit from a heavy high explosive bomb requires very costly structures; in practice, therefore, protection is obtainable only against blast and splinters. The incendiary bomb, however, has no great penetrative powers, but it is especially dangerous because it carries its own supply of oxygen for combustion and cannot be easily extinguished.

How Casualties are Caused

With high explosives, the danger is over as soon as the bomb has burst and the flying fragments have subsided, a matter of a few seconds, but with gas the danger begins with the bursting of the bomb. With a non-persistent gas, a poisonous cloud is formed and is carried before the wind until it becomes sufficiently diluted and dissipated to be no longer dangerous. It may thus cause casualties at some distance from the point where the bomb bursts, and may poison people in places where they would be safe from high explosive. With a persistent gas, the bursting bomb not only forms a small gas cloud which behaves like a non-persistent gas, but it also scatters the poisonous liquid over the surrounding area, which will remain dangerous till the liquid has all evaporated or has been destroyed.

The main defence against gas for the fighting services is the gas mask or respirator. Collective protection, by which is meant gas-protected shelters or dug-outs, has only a limited application, as troops cannot fight in dug-outs. With the civil population the reverse is the case, for the majority of the civil population can keep indoors, and that is the safest

thing for them to do as soon as an air-raid warning is given. Prompt action in getting under cover is essential as an aeroplane spray gives no warning. The aeroplane, if high up, may be a few miles away, and a man in the open air would get poisonous liquid on his skin and clothes before he realised his danger.

To make indoor protection as safe as possible, there should be in every house, office or building a gas-protected room or rooms in which the occupants can remain until the " all clear " signal is given.

The question at once arises as to where the selected room should be—in the basement, on the ground floor or in the higher storeys. Against high explosive bombs, the natural instinct is to go down into the deepest basement and to have as many floors above one's head as possible. With only the gas menace to consider, the top of the house would be the safest, as the occupants would be above the level of any gas clouds produced by bombs in the streets. With incendiary bombs, the greatest danger will be in the top storey. A compromise is therefore necessary when dealing with the three risks, and the official view suggests the basement, if there is no danger of flooding from burst water mains; failing that, the first floor, if the house has more than two storeys, or if not, the ground floor.

Making a Gas-proof Room

Having selected the suitable room, it should be made as gas-proof as possible by closing up with materials ready to hand all openings and all places likely to cause draughts. Cracks can be filled up with putty, or even mud, while wet newspaper is quite a useful material to be found in most households. The windows also require protection, as the glass may be broken by concussion, so they should, if possible, be boarded up outside, and sandbagged in addition; this will protect against high explosive splinters. In any case windows should be covered inside by stout materials, such as blankets, wetted for preference—linoleum, etc., to stop pieces of glass from flying about and to prevent the entry of gas should the windows be broken. Fires must also be extinguished in the gas-protected rooms, and the chimney closed to stop draughts; even the keyhole should be stopped..

In the case of a large room, it is necessary to provide an air lock for the entrance, as this will reduce the risk of gas getting in when the door is opened. An air lock is made by putting up two blanket screens a few feet apart across the entrance passage, so that a person can enter the space between the screens and adjust the fitting of the blankets before passing into the room. Such details as Mr. Pratt gave, regarding gas-protected rooms, will be found in Air Raid Precautions Handbook No. 1 (Stationery Office, 6d.).

Protecting Factory Employees

For factories it will often be found convenient to protect the workers in near-by zig-zagged trenches which will give excellent protection against splinters. Gas protection, however, may not be very easy to ensure for trenches, but the difficulty can be overcome by making the occupants put on gas masks when the presence of gas is detected. The trenches should be covered by corrugated iron or other convenient material to protect the occupants against sprays of poisonous chemicals. Such shelters should be restricted to 50 people as a maximum, to minimise the effect of a direct hit. Gas-protected shelters which are to be provided with artificial ventilation, should be allowed a minimum of 6 sq. ft. of floor space per person; where this cannot be provided, the irreducible minimum is 3.5 sq. ft. Ventilation should be at least 150 cubic feet per person per hour for periods of use limited to 2-3 hours. A special Handbook (No. 6) on Air Raid Precautions in Factories and Business Premises has been published (Stationery Office, 6d.).

The main problem that will arise in practice will be to find materials in the poorer quarters of a town which will be adequate for closing up all the cracks and crevices that exist in too many dwellings at the present day. Given the necessary materials and a reasonable amount of instruction, however, the problem of gas-proofing a room should not present undue difficulties except in slum areas, and here it may be necessary to evacuate the population to a safer area.

Everybody in a city cannot stay indoors until the raid is over. Essential services must go on, and gas masks will be necessary for people such as the police and fire brigades, for whom a high standard of protection will be wanted, because they may have to operate in highly contaminated areas. Such people would also require some measure of protective clothing of the nature of oilskins, in order to protect against aeroplane spraying and contamination by liquid splashes. Other services, such as those for first aid and decontamination, will have to continue to function, and they also will need gas masks, which can be of a simpler type.

No Defence Possible for Young Children

For " psychological and other reasons," said Mr. Pratt, gas masks will also be required for the civil population at large. These will serve as a second line of defence to the gas-protected room. As it would not be possible to supply the millions which will be wanted in an emergency in sufficient time, the Government has made arrangements for the production of a simple type costing about 2s. 6d. The defence programme calls for the manufacture of 30 million of these simple masks by the end of 1937; they will be stored under conditions which will ensure maximum life, and arrangements will, in due course, be made by the Government for their speedy issue if the emergency arises. This type will be called the " general civilian " respirator and it will be a free issue to everyone.

A gas mask will not protect against contamination of the clothing or the body by agents such as mustard gas, so that there is a danger that, having gas masks, the more venturesome members may go into the streets before the area is clear of gas and get contaminated The public must therefore be instructed against such risks. The conditions under which gas masks will be used by the public at large will probably be two-fold; firstly, in case of leakage of gas into a gas-protected room, and, secondly, when it is necessary to go into the street before the area is cleared of gas.

The production of a second line of defence for very young children is a special problem for which a satisfactory solution has not yet been found. Reports from the Continent indicate the possibility of using gas-protected cots!

The design of the gas masks is " based on many years' intensive scientific investigation." There have been criticisms of the general civilian type on the grounds that very much protection cannot be given at the low price at which the mask is to be made. At 2s. 6d. each, however, it will cost the taxpayer £4,000,000 to make gas mask provision for everyone; if a general service respirator (as supplied to the Army, Navy and Air Force) were provided, the cost would be nearer £30,000,000.

Decontamination Problems

The first aid and decontamination centres will have to be organised so as to deal as rapidly as possible with a large number of people who are either contaminated or suspect they are contaminated. Speed is the prime essential and the quicker a contaminated person can remove his clothing and scrub or wash the affected parts, the less likely he is to suffer any injury. As every minute matters, it will often be better for people to wash or bathe in their own homes rather than waste time by going to the decontamination centre where there may be delay because of the number of people waiting.

The treatment of gas casualities will be a problem for medical men. The decontamination of clothing is another problem bristling with technical difficulties, in view of the great variety of articles that will have to be treated and the need for speedy methods by which they can be rendered safe to use.

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Research in the Laundry Industry

Sir William Bragg Opens Laboratory Extensions at Hendon

SIR WILLIAM BRAGG, president of the Royal Society, opened a new extension of the laboratories of the British Launderers' Research Association at Hill View Gardens, Hendon, on Tuesday afternoon, and paid a warm tribute to the advances made in laundry research in recent years. The opening ceremony was preceded by a luncheon at the Brent Bridge Hotel, presided over by Mr. W. H. Markham, chairman of the Association.

Mr. MARKHAM, in welcoming the principal guests, referred to the presence of a number of directors of other research organisations as an indication of the close co-operation existing between the laundry and kindred industries. Among the apologies for absence was one from Lord Leverhulme, president of the Society of Chemical Industry, who expressed the congratulations of his Society upon an event which bore testimony to the valuable work of the Association which was so typical of the growth of that scientific attitude of mind which industry was now bringing to bear upon all its problems. In the past, said Mr. Markham, there had been difficulty in selling research to the industry, but with the rapid advance of the laundry industry there was a growing realisation of the absolute necessity for knowledge of both textiles and processes, and he was sure that before many years had passed no intelligent launderer would be able to exist outside the membership of the Association.

Extended Membership

With the sanction of the Department of Scientific and Industrial Research they had during the year extended their membership to include institutional launderers and manufacturers of laundry plant and materials, and they cordially welcome the advantages to be obtained from closer co-operation with those other branches of their industry, not only from the financial aspect, but because of the opportunity of pooling their knowledge. There had been an encouraging response from those new members which would make a great difference to the progress they would be able to make at Hendon. They were indebted to the Department of Scientific and Industrial Research for increasing their grant, which now amounted to £3,000.

Sir WILLIAM BRAGG said the apparatus gathered together in the extended laboratories carried them a long way beyond the ordinary conception of the washing of shirts in the laundry. When one considered the details of such an industry one found that the most intricate problems arose and only by attacking them scientifically could they attain their end. The laboratories had been in existence for some 16 years. He saw them many years ago and was impressed with the contrast between what they were then and the conditions prevailing to-day. The advance was a great testimony to the skill, the energy, the perseverance and the resolve to overcome whatever obstacles stood in the way of the launderer.

Convincing the Practical Man

They had had to met a great many troubles, one of the first of which was to persuade the practical person that research was any good at all. From what the chairman has said, that trouble had not yet disappeared, but it was disappearing, not only in their own sphere but in other places where such experimental work was carried out. It had been one of the constant experiences of all industries that when something new had turned up it could not be brought into complete development without long and careful experiment.

Unlike such industries as iron and steel, ceramics, or leather, the laundry industry had not had the advantage of organised effort, and the problems met with in their Association had had to be approached almost *de novo*. Their particular problems of chemistry and physics were complicated. Surface actions, which were the basis of the laundry industry, were extraordinarily important in all the processes of nature. Developments in artificial silk and in colouring matters had brought them new problems, and the difficulties in the way of the Launderers' Research Association had been exceptional.

One of the most important matters they had to deal with was to get the information out into the hands of the business, and they were going to do that in the future. There was only one way that was effective, and that was personal contact. Their workers might write articles or deliver lectures, and people would sometimes take notice, but sometimes they would not, but if they went and told a person he was doing wrong he had got to listen, if he was at all polite.

Lord BARNBY, of the Wool Industries Research Association, said it was right that emphasis should be laid on the importance of the research associations dealing with the technical side of their problem. There was a need for a common realisation of the necessity for research. Synthetic fibres and the manufacture of goods from casein were developments that had brought new and complicated problems to the laundryman.

A vote of thanks to Sir William Bragg and Lord Barnby was proposed by Councillor T. Taylor, hon. treasurer of the Association, and seconded by Mr. S. Bell, president of the Institution of British Launderers.

The visitors afterwards proceeded to the laboratories, where Sir William Bragg formally opened the new extensions.

Aims of the Association

Since its formation 16 years ago the Association has grown steadily and now includes 600 names in its membership. Fundamental investigations are being conducted into the properties of soap and kindred solutions used in the laundry. The exact degree of acidity or alkalinity desirable in the various solutions, their correct temperatures and the properties of individual soaps are being studied, while the engineering section advises on such problems as water treatment, boiler management and hot water systems.

Results obtained in the laboratory are tried out on a commercial scale in an experimental laundry in which one and a half tons of washing are dealt with each week. The laundry is equipped with all the machines necessary for carrying out laundry work and the machines are changed or modified according to the work in hand. New models and new inventions are often submitted for test by manufacturers. An important section of the laboratories is the analytical department, which undertakes the examination of materials used for washing and the examination of laundered articles submitted by members. This department is being increasingly used by members of the Association and more samples were submitted for examination last month than during any month since the formation of the Association.

The work of the laboratories is done in close contact with member firms. One of the best methods of bringing into practical use in the laundry the results of the research work carried out in the laboratory is the system of regular visits to members of the technical staff to members' laundries. In this way a useful contact is established between the member and his research association.

Laboratory Equipment

Features of the chemical laboratory are the Warren distillation apparatus, which provides a rapid means of determining the moisture content of a large number of substances; the A.S.T.M. distillation tube for determining the solvent content of spirit soaps by continuous distillation with steam; and the Soxhlet extraction apparatus, used to determine the amount of fatty matter in a weighted sample of wool by extracting it with petroleum ether.

In the determination of fatty acid, the solution of a known weight of soap is split by the addition of acid and the liberated fatty-acid then extracted with ether. The ether is distilled off and the fatty-acid weighed. By measuring the fluidity of a solution of the cotton in cuprammonium solution it is possible to determine the extent to which cotton has lost strength by treatment with chemicals.

In the fabrics laboratory there are the B.L.R.A. disc-tintometer, used for measuring the colour of " white " fabrics; a bursting-strength tester, which measures the pressure necessary to burst the fabric, in pounds per square inch; a tensile-strength tester, for measuring in pounds the pull necessary to break a strip of fabric 1 in. wide, and an ultra-violet lamp for detecting oil stains, metal stains, etc.; it also makes the new invisible marking ink visible.

In another department there is an apparatus consisting of a combined humidostat and tensiometer for investigating surface tension of detergent solutions under carefully controlled conditions, electrical apparatus for investigating rate of penetration of fabrics by detergent solutions, and experimental apparatus for investigating bulk viscosity and surface rigidity of soap solutions.

Glass electrode and hydrogen ion electrode systems are used for determining pH values of detergent solutions, and there is a drop-number apparatus and tensiometer for determining the interfacial tension of detergent solutions against various oils. An apparatus for determining the angles of contact between detergent solutions and textiles fibres, etc., a photo-electric densiometer for studying rate of sedimentations of suspensions, and an apparatus for preparing dilute emulsions of the type met with in laundry practice are other features of the laboratory equipment.

Water Supplies and Pollution

Manufacture of Foods and Beverages

ADDRESSING the British Waterworks Association at the Public Health Congress in London, on November 19, Dr. A. Parker, of the Water Pollution Research Board, said that the public water supply undertakings in Great Britain supply from 1,000 million to 1,500 million gal. per day. This quantity is used mainly for drinking and other domestic purposes, although some is used for industrial purposes.

In addition to the water distributed by the supply undertakings, even larger quantities are drawn direct from rivers and springs, and from wells for agricultural and industrial purposes. For example, beet sugar factories and many textile works each use several million gallons of water per day in manufacturing processes. Considerable volumes are also required by the railways and by most large works for raising steam for power and enormous volumes are employed for coolers and condensers. Of the many electricity generating stations, the two at Battersea and Fulham together circulate about 800 million gallons of water per day through condensers that is approximately three times the volume supplied by the Metropolitan Water Board to a population of more than seven million people.

Trade Effluents

Although water for numerous industrial processes need not be of the same high chemical and bacteriological capacity as drinking water, water of high quality is frequently necessary in the manufacture of foods and beverages, in the treatment of textiles, in raising steam and in other processes. Water distributed by public supply undertakings, though suitable for domestic purposes, is in fact often unsuitable for certain manufacturing processes owing to its hardness or to the presence of substances detrimental to the quality of the manufactured products.

Available sources of uncontaminated water, both surface and underground, are gradually being allocated. There is no doubt, however, that any probable future demand in this country for water of good quality can be met provided determined efforts are made to prevent undue pollution, but not otherwise. Unfortunately, the position at the moment is far from satisfactory. Many of the rivers are badly polluted by trade effluents.

Reviewing the legal enactments, Dr Parker said that there did not appear to be a dearth of legal measures directed against the pollution of rivers and streams. These legal measures have been in force for many years, but gross pollution still continues in many districts. It may be that some improvements in the legal enactments are desirable, but legal measures in themselves cannot solve many of the problems involved.

Satisfactory methods of purification of sewage and of dealing with many trade effluents, taking costs into consideration, are available. Local authorities and traders, particularly in co-operation, could do more than at present in applying these methods. At the same time it should be emphasised that these methods are by no means perfect and could undoubtedly be much improved or reduced in cost by systematic scientific investigation. Further, satisfactory methods of dealing with certain trade effluents at a cost which can be met without serious detriment to industry have not yet been discovered. In these instances it is unlikely that practicable methods will be discovered in a reasonable time without intensive scientific research.

Empire Exhibition, Johannesburg

I.C.I. Chemical Products on View

THE chemical industry is represented at the Empire Exhibition, Johannesburg, which will remain open until the middle of January, 1937.

A wide variety of products is to be seen on the stand of Imperial Chemical Industries, Ltd. The stand is painted throughout in " Dulux," a product of Nobel Chemical Finishes, Ltd., a subsidiary company of I.C.I., and the rubber flooring is made with I.C.I. rubber chemicals. Models of plant representative of recent important British developments in the chemical world are also shown. One item demonstrates the hydrogenation process; a second illustrates, by a descriptive diagram, the method by which " Drikold " (solid carbon dioxide) is produced. Another exhibit explains the uses to which cyanide is put in mining, engineering and other industries.

Samples of dyes and dyed products and a range of chemicals required by the rubber manufacturing industry; heavy chemicals and alkalies; and samples of moulding powders and of products made from them, are grouped in different showcases. " Perspex," a new I.C.I. transparent resin in sheet form, is also exhibited.

Industrial gases and oxy-acetylene welding and cutting equipment, etc., are featured by African Oxygen and Acetylene, Ltd. Lever Brothers are exhibiting high quality soaps.

UNITED STATES imports of casein, entered for consumption, during the first eight months of 1936 aggregated 11,863,144 lb. valued at $954,642 compared with 1,248,700 lb. value $109,500, in the corresponding period of 1935.

New Technical Books

TIN PLATE AND TIN CANS IN THE UNITED STATES. International Tin Research and Development Council. Bulletin 4.

This book, which is issued free, has been prepared by the staff of the Battelle Memorial Institute, Columbus, Ohio, in collaboration with the leading American technicians. Apart from detailed descriptions of methods and machinery used in making tinplate and tin cans, there are chapters devoted to the field for tinplate cans and containers, the history of the industries, statistics, tinplate lithographing, and the future prospects for improvements and new applications. A special feature is the large number of photographs and diagrams to illustrate the text.

* * *

EXERCISES IN GENERAL CHEMISTRY AND QUALITATIVE ANALYSIS. By Horace G. Deming and Saul B. Arenson. Fourth Edition. Pp. 326. John Wiley and Sons (Chapman and Hall, Ltd.). 9s.

Laboratory courses in chemistry used to be largely descriptive, but college courses are now putting more emphasis on general principles, and it has come to be realised that chemistry is something more than catalogued information about individual chemical substances. The present book has been published with the thought that an elementary course in chemistry has three chief aims: (1) To make the student familiar with a few representative types of matter; (2) to reveal some of the general principles that govern the transformations of matter; (3) to afford some experience with the experimental methods by which chemistry has won its advances. The book presents many exercises of a purely descriptive kind, though it attempts to organise these in such a way as to make them something more than an unordered sequence of trivial observations.

* * *

ORIGINS AND DEVELOPMENT OF APPLIED CHEMISTRY. By J. R. Partington. Pp. 597. Longmans, Green and Co. 45s.

The intention of this book is to give a reasonably concise and systematic account of the sources, production and uses of materials in Egypt, Babylonia and Assyria, the Ægean, Asia Minor, Persia, Syria and Palestine, from the earliest times to the end of the Bronze Age. In some cases the discussion has been extended to a later period. One important result of this survey, which could hardly have become clear without it, is the realisation that the knowledge of the use of materials in the Classical Period, which usually forms the starting point for the historian of science, is almost wholly derived from much older cultures. In the sections dealing with special materials (the arrangement of which has been varied to prevent monotony) attention has been given to the geographical distribution of ores, etc., since in some cases sites worked in antiquity have recently become of great economic importance. The section on the source of petroleum at Kerkuk, for example, was completed before the recent exploitation of this region, the occurrence of oil in which is clearly described by several older travellers. It is thought that information on older sources may not be without economic as well as historical interest. Since the book is intended to be of service to the specialist as well as to the reader who has merely a general interest in such subjects, the references to the literature are reasonably full, and each has actually been seen by the author in the form quoted. These references are intended to serve two main purposes. In the first place, they show the sources of each item of information, and thus enable the specialist to infer its probable accuracy. In the second place, they indicate to the reader wishing for further information a starting point for his investigations. There are about 7,000 numbered footnote references, each usually containing more than one citation, so that the number of single references to literature may exceed 25,000. Each of these concerns a statement of fact or opinion in the text, and great pains have been taken in various ways to ensure accuracy.

ELEMENTARY QUANTITATIVE ANALYSIS. By Carl J. Engelder. Second Edition. Pp. 270. John Wiley and Sons (Chapman and Hall, Ltd.). 13s. 6d.

Since the publication of the first edition of this text-book, the most significant change in the teaching of quantitative analysis has been to present the subject matter of volumetric analysis before that of gravimetric analysis. This reversal from the time-honoured conventional order has been advocated by many writers and teachers, who observe that the student finds a happier approach to the more precise and difficult technique of gravimetric methods by beginning the laboratory work with volumetric methods. Accordingly, in this second edition, volumetric analysis precedes gravimetric analysis. The text has been enlarged by the inclusion of additional procedures, such as the analysis of hydrogen peroxide and of pyrolusite; the determination of the available chlorine in bleaching powder, by both a direct and indirect iodimetric method; and complete brass and limestone analyses. New problems have been substituted for the rather time-worn ones in the first edition.

* * *

SOLUBILITY OF NON-ELECTROLYTES. By Joel H. Hildebrand. Second Edition. Pp. 203. Reinhold Publishing Corporation (Chapman and Hall, Ltd.). 22s. 6d.

This book is the outgrowth of many years of study of the problems presented by the various phenomena of solubility. The cordial reception accorded to the first edition evidently played a part in stimulating further researches, and the considerable progress made during the twelve years since its appearance have supplied the motives for this new edition. During this interval the theory of dipole moments has grown to maturity; the foundations of a general theory of intermolecular forces have been laid; several promising attempts have been made to deal quantitatively with the deviations of solutions from the ideal solution laws, particularly for that class of solutions that have come to be known as regular; extensive additions have also been made to the body of data having theoretical significance. In consequence of these developments the book has been almost entirely rewritten. The theory of dilute electrolytes has also made great advances during recent years, following the advent of the Debye-Huckel theory. This subject has assumed such magnitude and is so distinct from the theory of non-electrolytic solutions as to deserve a separate monograph, and has accordingly been omitted in rewriting the present edition of the book under review.

* * *

HANDBOOK OF CHEMISTRY AND PHYSICS. By Charles D. Hodgman. Twenty-first edition. Pp. 2,023. Chemical Rubber Publishing Co. $6.00.

This handbook, continuing the policy of the past, is being revised at frequent intervals. The general features and scheme of arrangement, which have received extensive endorsement in former editions, have been retained. The aim throughout has been to present in condensed form as large an amount of accurate, reliable and up-to-date information in the fields of chemistry and physics as was consistent with convenience in form and the possibility of wide utility and distribution. The present edition represents an increase in number of pages, over the preceding edition, of only 64. There are, however, over 175 pages of new composition entailed by complete revision of several important tables. The collection of laboratory arts and recipes has been completely revised and enlarged by material sent in by a large number of contributors in charge of or associated with educational or commercial laboratories. The increasing availability and widespread utilisation of commercial plastics makes particularly appropriate the new and unusually complete collection of data for this class of material. The table occupies 17 pages and covers a very wide range of properties. A revised table of isotopes also brings up to date the information in this rapidly changing field.

Modern Nutritional Problems

Some Chemical Aspects

ANIMALS are dependent on plants for certain compounds which they cannot synthesise themselves from potentially suitable material, said Professor J. C. Drummond, D.Sc., F.I.C., Professor of Biochemistry, University College, London, in giving the 35th Bedson Lecture at Armstrong College, Newcastle-on-Tyne, on November 20, his subject being "Chemical Aspects of some Modern Nutritional Problems." Such compounds can be divided into two types, (a) tissue building stores, and (b) what might be termed "chemical lubricants," *e.g.*, vitamins and hormones.

Cystine is a good example of the former type. Animals cannot synthesise this important amino-acid even if provided with sulphur, in various forms, and closely related non-sulphur containing compounds, for example, serine. However, they can use menthionine, and dithiol dilactic acid, but not homocystine and cystineamine to replace a cystine deficiency. Persons suffering from cystinuria who are given menthionine excrete it as cystine only. Vitamins A, B_1, C and D are examples of the second type.

Vitamin A has been shown to be a C_{20} compound, closely related to the carotinoid pigments. Those carotinoids possessing a β-ionone ring and a suitable side chain act as a precursors of the vitamin; β-carotene itself is probably quantitatively converted into it. It is remarkable that the molecule divides at the central double bond considering that polyene chains are usually susceptible to oxidative attack at various points. Certain birds can use xanthophylls as vitamin A precursors, whereas animals cannot. This raises the question of there being more than one vitamin A.

Chemical studies of vitamin C (*l*-ascorbic acid) are fairly complete and it is interesting to compare the antiscorbutic activities of various substituted ascorbic acids. *d*-Ascorbic acid is quite inactive, *d*-arabo-ascorbic acid possesses one-twentieth the activity, while *l*-rhamno-ascorbic acid and dehydro-ascorbic acid are less active. The preparation of these synthetic products possessing activity raises the question of the possibility of the synthesis of compounds of greater antiscorbutic power than vitamin C. Turning to vitamin D (calciferol), Professor Drummond said that it is generally held that rupture of one ring of its sterol precursor takes place during irradiation with ultra-violet light. Vitamin D activity is not dependent on the presence of a double bond in the side chain.

The relation between constitution and biological action is not yet clearly apparent. There are two views to account for the activity of the various compounds. Either it is necessary to provide substances capable of being broken down to simpler molecules, or compounds with the same carbon-skeleton as vitamin D are required. The former gleans some support from the fact that compounds, very different in structure from those obtained from natural sources, are capable of producing oestrus. For example, 1-keto-tetrahydrophenanthrene and certain dibenzanthrone diols have some activity. A more remarkable case is that reported by Professor Dodds who found that dihydroxydiphenyl is active.

Atmospheric Pollution

Half-Yearly Conference at East Greenwich

THIRTY-THREE representatives of local authorities and other organisations co-operating with the Department of Scientific and Industrial Research in connection with atmospheric pollution met for their half-yearly conference on Monday at the Fuel Research Station, East Greenwich. The gathering included representatives from Barnsley, Birmingham, Dagenham, Edmonton, Glasgow, Halifax, Lancaster, Leicester, Liverpool, Salford, Sheffield and Rotherham, Walsall, Westminster, Willesden, British Commercial Gas Association, British Electrical Development Association, and Cadbury Bros., Ltd. In the absence, owing to indisposition, of Mr. W. Brownhill Smith, Dr. H. A. Des Voeux, a former chairman, presided.

Dr. G. M. B. Dobson, chairman of the Atmospheric Pollution Research Committee, presented a report on the progress of the investigations. Arrangements were well in hand for the intensive survey of pollution in and around Leicester. It was expected that systematic observations with a substantial number of the different measuring instruments at about 12 stations in the area would begin, at all events in a preliminary way this month.

After the meeting, the representatives were shown the work in progress at the Fuel Research Station. Two fundamental and closely related factors involved in the reduction of atmospheric pollution by coal burning are the nature of the fuel and the appliance in which it is burned. The former leads to the selection from the varieties available of fuel most suitable for a given purpose. The aim in coal burning appliances is towards greater control over the combustion. In the domestic field attention has been devoted mainly to the production from coal of a free-burning smokeless fuel, by removing the greater part of the volatile matter which is responsible for most of the smoke nuisance. Appliances have been designed for the burning of such smokeless fuel.

The scope of the work was illustrated by exhibits which included samples of cleaned and graded coal, a Lancashire boiler fired with pulverised fuel, solid fuel converted into producer gas for use with a boiler, and various exhibits dealing with the development and testing of methods for measuring and sampling both industrial and domestic smokes.

Synthesis of Cyclopropane

Extended Use as an Anæsthetic

THE synthesis of the anæsthetic, cyclopropane, from the plentiful propane occurring in natural gas and crude petroleum has been reported to the American Chemical Society by research workers at Purdue University. The new process, it is declared, will allow wide adoption of the compound, which has hitherto been manufactured at a cost of about $20 a pound from trimethylene glycol, a by-product of the soap industry.

Professor H. B. Hass, Dr. E. T. McBee, G. E. Hinds and E. W. Gluesenkamp erected a plant at Purdue and successfully produced sufficient cyclopropane to carry out 1,000 anæsthesias daily by their method, which uses chlorine, an inexpensive chemical, as a reagent together with propane. The plant has now been transferred to the Mallinckrodt Chemical Works, at St. Louis, where it is in operation. Synthesis is a simple, two-step procedure. The propane molecule is composed of three carbon atoms in a straight chain with three hydrogen atoms attached to each end carbon atom, and two hydrogen atoms attached to the centre carbon atom. After treatment with chlorine one of the hydrogen atoms at either end of the chain is replaced by a chlorine atom. The chlorine atoms then combine and drop off, leaving the cyclopropane molecule, consisting of three carbon atoms in a ring, to each of which are attached two hydrogen atoms.

The previous discovery by Professor Hass and J. R. Marshall that "every possible monochloride and polychloride derivable without carbon-skeleton rearrangement is always formed when a paraffin is chlorinated under conditions which avoid excessive decomposition by action of heat" is the basis of the synthesis. The by-products of the process consist essentially of hydrochloric acid and propylene chloride, which are well known commercially, and of 1, 1-dichloropropane and 2, 2-dichloropropane, which are industrially new. The cyclopropane is accompanied by traces of propene and propane and somewhat larger amounts of 2-chloro-1-propene and 1, 3-dichloropropane. Purification is obtained by liquefaction and rectification. Cyclopropane has been known since 1882. It was first applied in human anæsthesia by R. M. Waters, in December, 1930

Personal Notes

Mr. J. E. HOBBS, a Scholar of Trinity College, Oxford, has been awarded the Gibbs Scholarship in Chemistry for 1936.

Dr. C. R. KENT, assistant chemist in the West Australian Railways Department, has returned to Australia after the completion of research work on the constitution of coals at London University extending over a period of two years.

Lord TIVERTON, whose forthcoming marriage to Miss Elizabeth Godley, of Cheltenham, has been announced, is engaged as a research chemist on the staff of Lever Brothers, Ltd., at Port Sunlight, where he is known to his colleagues and other members of the firm as Mr. Giffard, that being his family name. As the son and heir of Lord Halsbury, he devotes much of his spare time to educational activities connected with his firm, and is a member of the Port Sunlight Debating Society. He started work at Port Sunlight about a year ago, having taken his B.Sc. at London University.

Sir EDWIN DELLER, Principal of London University, died on Monday as the result of an accident on November 27, while inspecting the new buildings of the University. Accompanied by Mr. Harold Claughton, clerk of the Court of the University, Mr. Norman Williams, the resident engineer, and Mr. Arthur Pelling, he was going up in a lift to the tower which will surmount the new buildings when an empty skip fell on the party, injuring them and a workman.

Mr. JOHN LENNOX, of Bothwell, a director of Colvilles, Ltd., left personal estate valued £24,030.

Mr. JAMES MACLEOD, general manager of the Glasgow Corporation chemical works, retired on Monday after holding the position since 1925. For 16 years Mr. Macleod acted as chemist and chief chemist to the Glasgow Gas Department. Later he held the post of engineer and manager at Kirkintilloch and subsequently at Greenock. His success in the development of by-product recovery resulted in his being invited to become general manager in Scotland for Brotherston and Co., Ltd., Leeds, and he took charge of the Provan and Dawsholm works. He then became superintendent of the coke ovens, and chief chemist to James Nimmo and Co., Ltd., and was responsible for the erection of a modern battery of coke ovens, which provided a supply of surplus gas to Glasgow Corporation. Mr. Macleod was the first to take the F.I.C. by examination in chemical technology. He was an honours medallist in gas engineering of the City and Guilds of London Institute, taking first place in the United Kingdom. For six years he filled the lectureship in gas engineering in the Royal Technical College, Glasgow, where he received his earlier training. He has been chairman of the local sections of both the Institute of Chemistry and the Society of Chemical Industry. Mr. Macleod is setting up as consulting chemical and gas engineer at Glasgow.

Chemical Notes from Foreign Sources

Jugoslavia

PRODUCTION OF SYNTHETIC RUBBER at the Jerevan (formerly Erivan) combinate will commence about the middle of 1937, the hydro-electric power station in the vicinity having now been partially completed.

Peru

A COPPER REFINERY IS TO BE ERECTED in Croka by the Cerro de Pasco Copper Corporation, of Lima. It will be built by the middle of next year to yield 40 million lb. of copper per annum.

France

THE UTILITY OF PINE ROSIN in road surfacing compositions has been studied for the past three years by the Highways Department of the French Government. Results of trials on various roads in South-Western France appear to justify the addition of resin to road tars. It was found advisable to convert the crude rosin into the resinates of calcium, zinc, or aluminium, the two former being of particular interest in combination with tar owing to the marked increase in viscosity which opened the way to utilisation of the low viscosity tars produced in modern gasworks.

IN A REVIEW OF METHODS OF MAGNESIUM MANUFACTURE in "Industrie Chimique" (November, 1936) attention is drawn to the recent process of H. Lavoisier (French Pat. 802,579) based upon decomposition of magnesium sulphide obtained in turn by reduction of the sulphate. The latter, after dehydration, is mixed with one-third of its weight of coke and heated to about 200° C. in an inert atmosphere, heating being interrupted when no more sulphur dioxide is given off. When the mass has cooled down to 150° C. the furnace is charged with a mixture comprising 54 per cent. calcium carbide and 27 per cent. barium chloride (based upon the original weight of sulphate under treatment). On gradually raising the temperature to 1,250° C., the magnesium distils over and is condensed in a part of the furnace where the temperature is kept below 1,100° C.

Denmark

PRODUCTS TO BE PRODUCED AT THE NEW FACTORY of A/S Kemisk Vaerk Koge, which has now been completed, include intermediates for dyes, aniline dyes, shoe creams, lactic acid, calcium lactate, ferrous lactate, and oil of bitter almonds.

Belgium

A SIMPLE METHOD FOR PREPARING COLLOIDAL GOLD SOLUTIONS has been published by Honig in the "Journal de Pharmacie de Belgique" (1936, p. 534). In a 500 c.c. Jena flask are heated together 250 c.c. doubly distilled water (the second distillate should be collected in a vessel containing a tin rod, 10 cms. long and 9 mms. in diameter), 2.5 c.c. of 1 per cent. gold chloride solution, 2.65 c.c. of a 1.38 per cent. solution of potassium carbonate and 0.125 c.c. of a 1 per cent. oxalic acid solution. The moment that boiling commences, the flask is removed from the flame and 3 c.c. of a 1 per cent. formaldehyde solution are at once added, with vigorous shaking.

Japan

MONTHLY PRODUCTION OF HARDENED OILS by the Osaka Sansuiso K.K. (Osaka Oxygen and Hydrogen Co.) is to be increased from 500 to 1,000 tons. Production will also commence towards the end of this year of the company's new oil-splitting plant with a monthly output capacity of 50 tons of glycerine.

PARTICULARS OF THE COAL LIQUEFACTION COMPANY to be launched by the Japanese Government are now available. It will be semi-officially administered, the Government retaining half its capital of 100 million yen. An annual dividend of 5 per cent. is guaranteed. The company will command the Fischer patent, and will be entrusted with the entire substitute fuels industry. The Government will give the coal liquefaction undertaking a subsidy. The company's annual oil output to start with is fixed at one million tons. It will be called the "Teikoku Fuel Industry Company."

From Week to Week

THE INAUGURAL MEETING and dinner of the Manchester Chemical Club will be held at the Constitutional Club, St. Ann Street, Manchester, next Thursday. Dr. Herbert Levinstein, the president of the Club will preside.

WILLIAM WELLS, of 2 Russell Street, Arbroath, and Frederick Wood, of 21 Sydney Street, Arbroath, chemical workers, were each fined 30s. at Carnoustie Police Court on November 30, for having stolen 5 cwt. of lead and 18 lb. of brass from Carnoustie Chemical Works.

AN EXTENSION AT BABLAKE SCHOOL, COVENTRY, is to include the erection of a science building at a cost of £10,000, complete with chemical laboratories. Plans have already been approved by the school governors and work upon the building is expected to commence at an early date.

A LARGE DOUBLE STOREY BUILDING COLLAPSED during an outbreak of fire at the steel works of Hadfields, Ltd., Tinsley, Sheffield, on November 27. The loss is estimated to be £10,000. Hadfields' private fire fighting squad fought the blaze at its commencement, but six engines of the Sheffield fire brigade were ultimately in attendance.

A SERIOUS OUTBREAK OF FIRE at Milnrow, near Rochdale, was prevented by the Rochdale fire brigade, when petrol became ignited at the depot of the Anglo-American Oil Co. last week. The flames were prevented from reaching storage tanks containing 80,000 gallons of petrol. Foam extinguishers were used in fighting the outbreak.

THE NEW COKING PLANT at the Cleveland works of Dorman Long and Co., Ltd., has now been completed, the first battery of ovens having come into operation in July last and the second battery at the beginning of November. The plant is carbonising 20,000 tons of coal per week to give a weekly output of coke of 13,000 tons.

WILLIAM PATTISON (29), of Mainwaring Road, Bromborough, who was employed on the erection of petrol tanks at the Shell-Mex depot at Ellesmere Port, fell 40 feet on to the steel floor of a tank, on November 29. He suffered no injury and only slight shock. It is thought that the thigh boots with thick rubber soles which he wore saved him.

EUROPEAN VISITORS TO THE BRITISH INDUSTRIES FAIR, to be held in London and Birmingham from February 15 to February 26, 1937, will be able to secure reductions of from ten per cent. to fifty per cent. in the cost of their fares, irrespective of whether they travel by rail, ship, or plane. Full information regarding these concessions can be obtained from the chief European travel agencies, and vouchers entitling visitors to them are to be obtained from the nearest British Embassy, Legation or Consulate.

SPEAKING AT THE 274TH ANNIVERSARY MEETING of the Royal Society, on November 30, Sir William Bragg, the president, said that the Society had accepted a principal share in the responsibility for the administration of £200,000 bequeathed by Mr. H. B. Gordon Warren. The interest of this money was to be applied to the encouragement of research in metallurgy, engineering, physics and chemistry. The administering committee was to consist of eight members appointed by the Society and two by the governors of Williams Deacon's Bank.

THE DEPARTMENT OF INDUSTRIES, AT BOMBAY, has published a bulletin on the aluminium industry, discussing the extent to which the important raw materials are available in India. The bulletin specifically refers to the large deposits of bauxite available in the Thana district near Bombay which can be worked at very low cost owing to the availability of electric power. It discusses the sites for the location of the factory and has also estimated that about 750,000 tons of bauxite suitable for the production of aluminium would be available.

BACKED BY ANGLO-AMERICAN CAPITAL, a new company has been formed in Belgrade to exploit Yugoslav petroleum fields. The powers granted to the company are exceedingly wide and include not only the exploration and exploitation of bituminous and other mining fields, and the extraction of all by-products of such fields, but also the renting of other sources of petroleum, the production, purchase, sale, refining and transport of raw naphtha and all its by-products, the building of refineries, pipe lines, etc.

MODERN ALCHEMY was the subject of the Henry Sidgwick Memorial lecture at Cambridge, delivered by Lord Rutherford on November 28. Modern methods could now produce exceedingly minute quantities of gold, but only by the transmutation of an even more costly element—platinum. The possibility of the discovery of a substitute for radium was also mentioned by Lord Rutherford, who said "Lawrence has succeeded in producing an intense source of radio sodium which is equivalent in gamma ray activity to many grammes of radium." The amount of transformation is usually on a minute scale and only rarely is the matter produced either visible or weighable. In the case of gold, the gold is not visible.

THE BOTTLING TRADES CHEMICAL CO., LTD., Exmouth House, Pine Street, E.C.1, has increased its nominal capital by the addition of £2,000 beyond the registered capital of £2,000. The additional capital is divided into 1,900 preference shares of £1 and 2,000 ordinary shares of 1s. each.

THE NOMINAL CAPITAL of Catalin, Ltd., chemical manufacturers, Charterhouse Square, E.C.1, has been increased by the addition of £249,900 beyond the registered capital of £100. The additional capital is divided into 999,600 ordinary shares of 5s. each. The company has been converted into a "public" company.

A REPRESENTATION has been made to the Board of Trade under Section 10(5) of the Finance Act, 1926, for the exemption of oxy-aceto-mercuric-propyl-ethyl urethane from Key Industry Duty. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, not later than December 31.

THE CENTRAL AGRICULTURAL AND SCIENTIFIC BIBLIOGRAPHY, which works from the Science Museum Library, South Kensington, is now extending its operations and opening Section 5 of its scheme, which deals with industrial chemistry and physics. Subscribers may now secure bibliographies of past work on specific subjects in this direction. Particulars can be obtained on application to the hon. secretary of the Central Agricultural and Scientific Bibliography, Science Museum Library, South Kensington, S.W.1.

BRITISH COAL DISTILLATION, LTD., announce that negotiations with the National Carbonising Co., Ltd., have been brought to a successful conclusion by which all outstanding differences between the two companies have been satisfactorily adjusted and further litigation avoided. Under the settlement the National Carbonising Co., Ltd., in consideration of a shareholding in British Coal Distillation, have transferred to them the whole of the patents, British, dominion and foreign, covering the process developed and operated by the Distillation company.

THE BOARD OF TRADE has received an application under Section 5 (5) of the Finance Act, 1936, for a licence to import free of duty a polarimeter of the Schmidt and Haensch type adapted to provide direct readings to one-thousandth of one degree, complete with monochromator and special compensator. Any representations that a similar instrument is made or is likely to be made within a reasonable time in the United Kingdom or elsewhere in the Dominions should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, London, S.W.1, not later than December 26.

RICHARD THOMAS AND CO., LTD., have placed the order for plant for the new coke oven and by-product recovery works at Ebbw Vale (Mon.) with the Woodall-Duckham Co., London. The plant, which will comprise a battery of 65 ovens, will be capable of producing 330,000 tons of blast furnace coke per annum. Coal consumption will be about 500,000 tons per annum. Apart from the oven battery, plant will be installed for blending, crushing and handling the coal before charging to the ovens for the recovery of tar, ammonia and benzole. Benzole production will be about 1,000,000 gallons a year. The scheme forms part of the £5,000,000 works building plans of Richard Thomas and Co., Ltd., at Ebbw Vale. The construction work on the by-product section will begin early in the New Year and is expected to be completed in 14 to 15 months.

Latest Oil Prices

LONDON, Dec. 2.—LINSEED OIL was firmer. Spot, £28 per ton (small quantities), Dec. and Jan.-April, £25 10s.; May-Aug., £25 12s. 6d.; Sept.-Dec., £25 17s. 6d., naked. SOYA BEAN OIL was firmer. Oriental (bulk), ex tank, spot, Rotterdam, £27 10s. per ton. RAPE OIL was steady. Crude, extracted, £33 10s. per ton; technical refined, £34 10s., naked, ex wharf. COTTON OIL was dearer. Egyptian crude, £28 10s. per ton; refined common edible, £32; deodorised, £34, naked, ex mill (small lots £1 10s. extra). TURPENTINE was steady. American, spot, 41s. 9d. per cwt.

HULL.—LINSEED OIL, spot, quoted £25 17s. 6d. per ton; Dec. and Jan. to Aug., £25 7s. 6d. COTTON OIL.—Egyptian, crude, spot, £29 per ton; edible, refined, spot, £31; technical, spot, £31; deodorised, £33, naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £30 10s. per ton, naked. GROUNDNUT OIL.—Extracted, spot, £33 per ton; deodorised, £36. RAPE OIL.—Extracted, spot, £33 per ton; refined, £34. SOYA OIL.—Extracted, spot, £30 10s. per ton; deodorised, £33 10s. COD OIL.—Fo.r. or f.a.s., 25s. per cwt., in barrels. CASTOR OIL.—Pharmaceutical, 44s. per cwt.; first, 39s.; second, 37s. TURPENTINE.—American, spot, 43s. 3d. per cwt.

Inventions in the Chemical Industry

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

MOTOR FUELS.—I. G. Farbenindustrie. May 22, 1935. 6599/36.

METHOD OF AND COMPOSITION FOR THE TREATMENT OF WATER.—C. F. Burgess Laboratories, Inc. May 22, 1935. 13431/36.

PREPARATION OF *a*-METHYLACROLEIN.—Röhm and Haas, A.-G. May 18, 1935. 13484/36.

MANUFACTURE OF CONDENSATION PRODUCTS.—Fahlberg-List, A.-G. Chemische Fabriken. May 21, 1935. 13692/36.

MANUFACTURE OF ZINC SULPHIDE.—Hercules Powder Co. May 21, 1935. 14050/36.

PROCESS FOR INCREASING SLIP IN STRUCTURELESS FOILS composed of highly polymeric materials.—Kohmm-Ges. Auf Aktien Wolff and Co. May 23, 1935. 14215/36.

REFINING OF MINERAL OILS.—Edeleanu Ges. May 22, 1935. 14396/36.

REFINING OF HYDROCARBON OILS.—Edeleanu Ges. May 23, 1935. 14399/36.

CLEANING AND DEGREASING OF MATERIALS.—Imperial Chemical Industries, Ltd. May 22, 1935. 14580/36.

MANUFACTURE OF VAT DYESTUFFS of the dipyrazolanthrone series.—I. G. Farbenindustrie. May 23, 1935. 14638/36.

DEGREASING-APPARATUS.—Imperial Chemical Industries, Ltd. May 23, 1935. 14793/36.

MANUFACTURE AND PRODUCTION OF AGENTS suitable for improving lubricants.—I. G. Farbenindustrie. Jan. 29, 1935. 31443/36.

CONTINUOUS PROCESS FOR DISTILLING HIGHER FATTY ACIDS.—Procter and Gamble Co. May 16, 1935. 23867/35.

CONTINUOUS COUNTERCURRENT HYDROLYSIS OF FAT.—Procter and Gamble Co. May 16, 1935. 23868/35.

PROCESS FOR EXTRACTING A LIQUID MIXTURE with the aid of a selective solvent. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. May 14, 1935. 5081/36.

PROCESS OF REFINING MAGNESIUM and magnesium alloys.—I. G. Farbenindustrie. May 10, 1935. 9691/36.

PROCESS FOR THE CONCENTRATION OF ACTIVE CARBON.—Carbo-Norit Union Verwaltungs-Ges. May 10, 1935. 10474/36.

PROCESS FOR THE MANUFACTURE OF CALCINED PHOSPHATES.—Kali-Chemie, A.-G. May 14, 1935. 10599/36.

STORING AND PRESERVING LIQUID subject to decomposition such as local anaesthetic solutions.—Novocol Chemical Manufacturing Co., Inc. May 10, 1935. 10905/36.

PRODUCTION OF GAS MIXTURES rich in hydrogen.—Ges. Für Linde's Eismaschinen, A.-G. May 11, 1935. 12445/36.

CONVERSION OF HYDROCARBON OILS.—Universal Oil Products Co. May 16, 1935. 12838/36.

PROCESS FOR MAKING PHENOL, cresol, or the like resins.—I. Kreidl. May 15, 1935. 13018/36.

CONDENSATION PRODUCTS.—Deutsche Bekleidungsindustrie Ges. May 11, 1935. 13353/36.

PROCESS FOR THE ELECTROLYTIC MANUFACTURE of hyposulphites.—I. G. Farbenindustrie. May 10, 1935. 13359-60/36.

PROCESS FOR THE ELECTROLYTIC MANUFACTURE of hyposulphites.—I. G. Farbenindustrie. May 10, 1935. 13361/36.

PROCESSES FOR RENDERING TEXTILE WEBS containing cellulose water-repellant and creaseproof.—Herberlein and Co., A.-G. May 14, 1935. 13551/36.

TREATMENT OF HYDROCARBONS of low boiling-point.—Edeleanu, Ges. May 15, 1935. 13693/36.

PROCESSES AND APPARATUS for the purification of juices and the treatment of solutions.—E. J. Hugel. May 15, 1935. 13790/36.

TREATMENT OF SOLID LIQUID, or gaseous hydrocarbon-containing materials for the production of valuable compounds.—F. Uhde. May 15, 1935. 13841/36.

ESTERS OF ACIDS of the acrylic series and their applications.—E. I. du Pont de Nemours and Co. May 16, 1935. 13858/36.

MANUFACTURE OF SYNTHETIC RESINS.—E. I. du Pont de Nemours and Co. May 16, 1935. 13859/36.

Specifications Accepted with Date of Application

PURIFICATION OF SILICA.—R. Hutchinson, and W. H. Reynolds. May 7, 1935. 456,513.

PRODUCTION OF CONCENTRATED NITRIC ACID.—E. I. du Pont de Nemours and Co. Feb. 20, 1934. 456,446.

MANUFACTURE AND PRODUCTION OF WASHING, wetting, emulsifying, softening and like agents.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). April 5, 1935. 456,517.

PRODUCTION OF HIGHLY CONCENTRATED NITRIC ACID.—G. P. Davies, and Imperial Chemical Industries, Ltd. April 5, 1935. 456,518.

MANUFACTURE OF GLYCEROL MONO-LACTATE.—Howards and Sons, Ltd., and R. H. Lock. April 10, 1935. 456,525.

PROCESS OF PRODUCING ESTERS of phenolaldehyde resins.—H. T. Bucherer. April 13, 1934. 456,723.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the dibenzanthrone series.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). May 7, 1935. (456,579.)

PROCESS FOR THE MANUFACTURE OF WATERPROOF PRODUCTS from animal fibrous material.—C. Freudenberg, Ges. May 7, 1934. 456,726.

REMOVAL OF HYDROGEN SULPHIDE from gases.—Gas Light and Coke Co., W. K. Hutchinson, and G. Dougill. May 8, 1935. 456,661.

METHOD FOR THE PRODUCTION OF A DISPERSION OF A GAS in a liquid.—Allgemeine Elektricitats-Ges. May 8, 1934. 456,581.

MANUFACTURE OF COMPOUNDS containing the aetiocholane nucleus.—A. G. Bloxam (Soc. of Chemical Industry in Basle). May 9, 1935. 456,663.

MANUFACTURE OF NITROGENOUS POLYVINYL DERIVATIVES.—W. W. Groves (I. G. Farbenindustrie). May 10, 1935. 456,530.

MANUFACTURE OF UNSATURATED ORGANIC COMPOUNDS.—J. W. C. Crawford, J. Grigor, and Imperial Chemical Industries, Ltd. May 10, 1935. 456,533.

PROCESS FOR THE MANUFACTURE OF NITROGENOUS AROMATIC ALDEHYDES.—A. Carpmael (I. G. Farbenindustrie). May 11, 1935. 456,534.

PROCESS FOR THE MANUFACTURE OF THIAZOLIUM COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie). May 11, 1935. 456,735.

MANUFACTURING OF TANNING AGENTS.—J. R. Geigy, A.-G. May 11, 1934. 456,741.

PRODUCTION OF LAKE COLOURS.—E. I. du Pont de Nemours and Co. May 11, 1934. 456,744.

PRODUCTION OF CELLULOSE-XANTHATE SOLUTIONS.—J. W. Brown. March 14, 1934. 456,841.

FILTERS AND OTHER APPARATUS containing porous parts.—I. G. Farbenindustrie. April 14, 1934. 457,035.

PROCESS FOR DYEING LEATHER.—A. Carpmael (I. G. Farbenindustrie). April 15, 1935. 456,844.

PROCESS FOR THE MANUFACTURE OF WATER-INSOLUBLE AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). April 16, 1935. 457,036.

MANUFACTURE OF DITERPENES.—Howard and Sons, Ltd., and W. E. Huggett. April 18, 1935. 456,974.

MANUFACTURE OF ACID DYESTUFFS of the anthraquinone series I. G. Farbenindustrie. May 19, 1934. 457,106.

GLASS PIPE LINES.—Neue Glasindustrie-Ges., Ges. June 6, 1934. 457,143.

PROCESS FOR THE MANUFACTURE OF SULPHAMIC ACID FLUORIDES. A. Carpmael (I. G. Farbenindustrie). May 21, 1935. 457,119.

APPARATUS FOR VACUUM DISTILLATION.—E. W. Fawcett, and Imperial Chemical Industries, Ltd. May 21, 1935. 457,120.

TREATMENT OF CELLULOSE ACETATE and other organic esters of cellulose.—British Celanese, Ltd., H. Dreyfus, and R. W. Moncrieff. May 23, 1935. 457,134.

RECOVERY OF PHENOLS.—C. A. Kerr, J. W. Woolcock, and Imperial Chemical Industries, Ltd. May 23, 1935. 457,139.

MANUFACTURE OF AZO DYESTUFFS.—A. G. Bloxam (Soc. of Chemical Industry in Basle). May 30, 1935. 457,047.

MANUFACTURE OF SUBSTITUTED DIAMINES.—Boots Pure Drug Co., Ltd., F. L. Pyman, and H. H. L. Levene. June 19, 1935. 456,916.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS of the anthraquinone series.—Coutts and Co., and F. Johnson (Legal representatives of J. Y. Johnson (deceased)). (I. G. Farbenindustrie). July 12, 1935. 457,055.

CONCENTRATION OF ACETIC ACID.—M. H. Carpmael (Soc. des Produits Chimiques de Clamcey, and Etablissements Lamboitte Frères). July 13, 1935. 456,921.

EMULSIFICATION OF LIQUIDS and apparatus therefor.—S. G. Bauer, L. Strangman, and J. H. Schulman. Aug. 13, 1935. 457,058.

Applications for Patents

(November 5 to 18 inclusive.)

DECOLOURIZATION OF SEWAGE EFFLUENTS, ETC.—J. Crosfield and Sons, Ltd. 30206.

PRODUCTION OF GAS FROM FUELS.—Didier-Werke A.-G. (Germany, March 3.) 30128.

PRODUCTION OF AMMONIUM NITRATE, ETC.—Directie van de Staatsmijnen in Limburg. (Holland, Nov. 18, '35.) 30334.

SYNTHETIC RESINS, ETC.—E. I. du Pont de Nemours and Co. (United States, Nov. 5, '35.) 30202.

MANUFACTURE OF DYESTUFFS OF THE ANTHRAQUINONE SERIES, ETC. E. I. du Pont de Nemours and Co. 30346, 30347.

PRODUCTION OF CELLULOSE ETHERS.—E. I. du Pont de Nemours and Co. (United States, Nov. 9, '35.) 30586.

MANUFACTURE OF CONDENSATION PRODUCTS.—H. D. Elkington (Nowack A.-G. Hessen and Hecht). 30312.

MANUFACTURE OF ELECTRIC INSULATING MATERIAL FROM CELLULOSE. L. S. E. Ellis (Chemical Works, formerly Sandoz). 30181.

MANUFACTURE OF CELLULAR RUBBER.—Firestone Tyre and Rubber Co., Ltd. (United States, Nov. 20, '35.) 30289.

MANUFACTURE OF ARSENOBENZENE-MONOSULPHOXYLATES.—I. G. Farbenindustrie. (Germany, Dec. 19, '35.) 30370.

MANUFACTURE OF TETRAKISAZO-DYESTUFFS containing copper.—I. G. Farbenindustrie. 30416.

MANUFACTURE OF POLYMERISATION PRODUCTS.—I. G. Farbenindustrie. (Germany, Nov. 9, '35.) 30488.

ACETYLENE-GENERATORS.—I. G. Farbenindustrie. (Germany, Nov. 9, '35.) 30490.

ACETYLENE-GENERATORS.—I. G. Farbenindustrie. (Germany, Dec. 5, '35.) (Cognate with 30490). 30491.

ACETYLENE-GENERATORS.—I. G. Farbenindustrie. (Germany, Dec. 7, '35.) (Cognate with 30490.) 30492.

MANUFACTURE, ETC. OF URETHANES containing carboxyl, etc. groups.—I. G. Farbenindustrie. (Germany, Nov. 8, '35.) 30506.

PARTIAL OXIDATION OF ORGANIC COMPOUNDS.—Imperial Chemical Industries, Ltd., and D. M. Newitt. 30345.

MANUFACTURE OF AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and F. L. Rose. 30718.

PRODUCTION OF STARCH, ETC., FROM CORN.—International Patents Development Co. (United States, Nov. 11, '35.) 30845, 30846.

MANUFACTURE, ETC., OF ORGANIC CYANOGEN COMPOUNDS.—G. W. Johnson (I. G. Farbenindustrie). 30172.

MANUFACTURE OF GLUE POWDERS.—G. W. Johnson (I. G. Farbenindustrie). 30504.

SIZING OF PAPER.—G. W. Johnson (I. G. Farbenindustrie). 30505.

CATALYTIC REDUCTION OF CARBOXYLIC ACIDS.—G. W. Johnson (I. G. Farbenindustrie). 30705.

STABILISATION OF PHOTOGRAPHIC SENSITIVE MATERIALS.—J. D. Kendall. 30374.

MANUFACTURE OF LUBRICATING OILS.—Imperial Chemical Industries, Ltd., A. P. Lowes, and D. E. White. 30827.

MANUFACTURE OF SIZE.—A. S. Lowry. 30450.

MANUFACTURE OF HORTICULTURAL POISONS.—Lunevale Products, Ltd., and E. B. Higgins. 30555.

CLEANSING, ETC. OF OILS.—W. K. Magan. 30471.

MANUFACTURE OF SYNTHETIC RESINS.—W. C. Peek. 30440.

HYDROGENATION OF COAL, ETC.—S. Prisner. 30807.

MANUFACTURE OF TERTIARY CARBINOLS of the cyclopentanopolyhydro-phenanthrene series.—Schering-Kahlbaum, A.-G. (Germany, Nov. 9, '35.) 30576.

MANUFACTURE OF DYESTUFFS, ETC.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 6, '35.) 30284.

MANUFACTURE OF COLOUR-PRINTING PREPARATIONS.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 12, '35.) 30286.

HYDROCARBON CONDENSATION PRODUCTS.—Standard Oil Development Co. (United States, Jan. 2.) 30177.

CATALYTIC TREATMENT OF PARAFFIN HYDROCARBONS.—Universal Oil Products Co. (United States, Nov. 11, '35.) 30557.

REMOVAL OF SULPHUR DIOXIDE FROM WASTE GASES.—University of Illinois, Board of Trustees. (United States, Dec. 23, '35.) 30843.

RECOVERING SULPHUR DIOXIDE FROM WASTE GASES.—Board of Trustees of University of Illinois. (United States, Dec. 23, '35.) 30844.

MANUFACTURE OF CALCIUM HYDRIDE.—Ventures, Ltd. (United States, Nov. 19, '35.) 30818.

PROCESS FOR ELECTROLYTICALLY OXIDISING ALUMINIUM, ETC.—Vereinigte Aluminiumwerke, A.-G. (Germany, Nov. 5, '35). 30194.

MANUFACTURE OF TRIALYKLACETAMIDES with saturated alkyl groups.—F. W. Williams. 30168.

MANUFACTURE OF RED LEAD.—A. Wreschner. 30726.

MANUFACTURE OF DYESTUFFS, ETC.—Soc. of Chemical Industry in Basle. (Switzerland, Nov. 5.) (Cognate with 30284). 30285.

MANUFACTURE OF LOWER-BOILING HYDROCARBONS.—E. Berl. 31549.

PREPARATION OF STABLE COLLOIDAL SULPHUR.—E. Boulogne. (France, June 17.) 31497.

MANUFACTURE OF LECITHIN PREPARATIONS.—C. H. Buer. 31201.

EXPLOSIVE COMPOSITIONS containing solid nitro-explosives.—F. R. Burrows. 31460.

EXPLOSIVE COMPOSITIONS containing solid nitro-explosives.—J. G. Burrows. 31460.

REDUCTION OF METAL SULPHIDES.—Calloy, Ltd. 31252.

MANUFACTURE OF TETRAHYDROXYAMYLAMINO-2-NITROBENYENES.—A. Carpmael (I. G. Farbenindustrie). 31114.

MANUFACTURE OF CHLORINATED RUBBER.—A. Carpmael (I. G. Farbenindustrie). 31204.

MANUFACTURE OF STABLE SOLUTIONS of the polyoxyalkyl-isoalloxazines.—A. Carpmael (I. G. Farbenindustrie). 31466.

MANUFACTURE OF WATER-INSOLUBLE AZO DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie). 31621.

PRODUCTION OF FINELY DIVIDED VAT DYES.—Courtaulds, Ltd., and T. H. Morton. 31445.

MANUFACTURE OF ORGANIC COMPOUNDS.—H. Dreyfus. 31179.

PRINTING, ETC., OF TEXTILE MATERIALS.—E. I. du Pont de Nemours and Co. (United States, Nov. 13, '35.) 31069.

MANUFACTURE OF ALIPHATIC DIAMINES.—E. I. du Pont de Nemours and Co. (United States, Nov. 15, '35.) 31374.

PRODUCTION OF NITRIC ACID, ETC.—P. Parrish. 31322.

Chemical and Allied Stocks and Shares

SINCE the beginning of the new Stock Exchange account on Monday firmer conditions have been in evidence in the stock and share markets. The general tendency has been to higher prices, and most shares of chemical and kindred companies moved moderately in favour of holders. Distillers were strong with a renewed advance to 119s., aided by growing hopes in the market that a bonus may be forthcoming next year. Imperial Chemical, which are now converted into stock and dealt in in £1 units, are 42s. 9d. at the time of writing, or within 3d. of the price ruling a week ago. United Molasses have continued active under the influence of the good results for the past year. There has been a revival of vague talk in the market that an agreement relating to industrial alcohol may be made between the company and Imperial Chemical Industries. There is already co-operation between United Molasses and Distillers in this respect. Buying of the deferred shares of Petroleum Storage and Finance was reported on the view that the shares are likely to re-enter the dividend list for the current year with a favourable payment. The company markets the petrol-alcohol blend of motor spirit produced by the Distillers Co.

There was profit-taking in B. Laporte, which, following their recent rise, have now reacted from 131s. 3d. to 127s. 6d. Nevertheless the market is continuing to anticipate a favourable increase in the distribution, either by way of a larger dividend or by the addition of a share bonus. Goodlass Wall and Lead Industries were steady around 15s., and there was again demand for Amalgamated Metal Corporation ordinary and Metal Traders ordinary on the view that both companies are likely to benefit from the much-increased activity in the metal markets. British Glues continued in favour on the possibility of a good increase in dividend for the current year and British Drug Houses were again reported to be active on the apparently attractive yield offered. William Blythe were steady and Blythe Colour Works and Cellon were both well maintained, aided by current market estimates of the final dividend payments for the year. Wall Paper Manufacturers deferred units of stock have reacted to 41s. 10½d. at the time of writing, the further references to competition, made at the recent meeting, having affected sentiment. Paint shares were less active, but Pinchin Johnson were bought on any reaction, there being continued talk in the market of a possible bonus next year.

Dorman Long were in active demand at higher prices, the excellent expansion in profits shown by the results and the further strength added to the financial position having created an excellent impression. The assumption in the market is that during the current financial year a further good advance in profits is probable, and the annual meeting is consequently being awaited with interest.

Richard Thomas more than held their recent rise, news of the intention to re-open another steelworks early in the new year having attracted attention to the indications that in the future steel production may become a more important part of the company's activities than the production of tin plate. Consett Iron moved in favour of holders and Staveley were firm. International Combustion were well maintained on current dividend estimates and Cannon Iron Foundries were more active.

Boots Pure Drug have moved up a few pence to 56s. 9d. Timothy Whites and Taylors were lowered to 34s. 4½d., but they are now "ex" the dividend. British Tar Products were steady on satisfaction with the repetition of the payment for the year at 15 per cent. Sulphide Corporation kept around the lower price to which they went recently. There appears to have been disappointment in some quarters that a larger increase is not being made in the dividend, but it has to be remembered that the accounts are made up to June 30, and that it has been since then that zinc and lead prices have shown a stronger tendency. Triplex Safety Glass continued to be held firmly on the possibility of a bonus later on and Lancegaye Safety Glass were active, having remained under the influence of the recently declared dividend which has aroused hopes in some quarters that the total dividend may be raised to 20 per cent.

Oil shares were more active. There is growing confidence in the market that the "Shell" and Royal Dutch companies will announce the resumption of interim payments in January.

Weekly Prices of British Chemical Products

THE price of refined glycerine was advanced on November 27 by £10 per ton. There are no price changes in the markets for other general heavy chemicals, rubber chemicals, wood distillation products, perfumery chemicals, essential oils or intermediates. In the pharmaceutical section a rearrangement has been made of the prices and terms applicable to the sale of smaller quantities of bismuth salts with the object of simplifying the payment of accounts. The three schedules affecting quantities under 4 lb., 4 lb. to 8 lb., and 8 lb. to 28 lb. are now to be net monthly account, but net 14 days terms (without the option of 3d. per lb. extra for monthly account) apply to the three schedules for 28 lb. to 1 cwt., 1 cwt. to 2 cwt. and for larger quantities.

Price Changes

General Chemicals.—GLYCERINE, chemically pure, double distilled, 1.260 s.g., in tins, 77s. 6d. to 92s. 6d. per cwt. according to quantity; in drums, 65s. to 78s. 6d.

Coal Tar Products.—CREOSOTE, B.S.I. specification, 5¾d. to 6d. per gal.

Pharmaceutical Chemicals.—BISMUTH SALTS: Carbonate, 6s. 6d. to 8s. 6d. per lb.; citrate, 9s. 8d. to 11s. 8d.; nitrate cryst. 4s. 7d. to 6s. 7d.; oxide, 10s. 8d. to 12s. 8d.; salicylate, 7s. 11d. to 9s. 11d.; subchloride, 10s. 5d. to 12s. 5d.; subgallate, 7s. 7d. to 9s. 7d.; subnitrate, 5s. 8d. to 7s. 8d.

MANCHESTER.—A further improvement in buying interest has been in evidence on the Manchester chemical market during the past week. Price conditions generally are strong, more especially in the non-ferrous metal compounds, although there are still odd instances where indications of easiness are apparent. Consumers are showing increasing interest in covering potential requirements over periods of the coming year and some sellers this week have reported a fair volume of forward business. Conditions in the bleaching, dyeing and finishing trades show a slight improvement and the quantities of textile chemicals that are being taken up in Lancashire and Yorkshire are regarded as relatively satisfactory, whilst specifications from other directions are on a steady scale. Among the tar products prices are mostly steady to firm and in the lighter materials a fair business is being transacted.

GLASGOW.—There has been an improved demand for chemicals for home trade during the week, though export business still remains very quiet. Prices generally continue firm at about last week's figures, with no important changes to report. Prices of coal tar products are more or less unchanged from last week. Works in this district appear to be active in all departments, but it may be safely assumed that the pressure is largely in the direction of completing existing contracts, some terminating at the end of the year. Bulk deliveries into home consumption include moderate quantities of carbolic acid 60's, and crude benzol, while on the export side there has been a fair movement of creosote. Available supplies of cresylic acid are finding a ready outlet. Pitch remains nominal at last week's values.

General Chemicals

ACETONE.—£62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—9¼d. per lb., less 2½%; d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¾d. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 7d. to 3s. 9d. per gal. MANCHESTER: 99/100%, pale, 3s. 6d.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50: pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 9s. 6d. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11¾d. less 5%. MANCHESTER: 11½d. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19 (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £6 19s. per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish £17 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£6 to £7 10s. per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.a. London.

BLEACHING POWDER.—Spot, 35/37%. £7 19s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX COMMERCIAL.—Granulated, £14 10s. per ton; crystal £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—4s. 1d. to 4s. 3d. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: 70/75% solid, £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10½d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 19s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%. £25 to £28 ex store.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LAMPBLACK.—£23 to £24 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £35 10s., brown, £34.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £35 per ton less 2½%, carriage paid, for 2-ton lots.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

PHENOL.—6¾d. to 7½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4½d. per lb. MANCHESTER: £38 10s. per ton.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8½d. per lb. SCOTLAND: B.P. Crystals, 8½d. MANCHESTER: B.P. 10½d. to 11½d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 6½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4½d. to 4¾d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £17 10s. per ton f.o.b. SCOTLAND: £17 15s. per ton less 5%.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 1d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, December, £7 0s. 6d. per ton; January, 1937, £7 2s. per ton; February, £7 3s. 6d. per ton; March to June, £7 5s. per ton.

CALCIUM CYANAMIDE.—December, £7 per ton; January, 1937, £7 1s. 3d. per ton; February, £7 3s. 6d. per ton; March, £7 3s. 9d. per ton; April to June, £7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.

NITRO-CHALK.—£7 5s. per ton for delivery to end of June, 1937.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to end of June, 1937.

CONCENTRATED COMPLETE FERTILISERS.—£10 12s. to £11 1s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. 2d. to 3s. 3d. per gal.; 99/100%, 3s. 6d. to 4s. per gal., according to specification; pale 99%, 3s. 4d. to 3s. 5d.; dark, 2s. 9d. to 2s. 10d. GLASGOW: Pale, 99/100%, 3s. to 3s. 6d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 5d. to 2s. 8d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7¼d. per lb.; crude, 60's, 2s. 7d. to 2s. 9d. per gal. MANCHESTER: Crystals, 6¾d. to 7d. per lb.; crude, 2s. 8d. per gal. GLASGOW: Crude, 60's, 2s. 6d. to 2s. 9d. per gal.; distilled, 60's, 2s. 9d. to 3s. 3d.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3½d. GLASGOW: Crude, 9d. to 10d. per gal.; motor, 1s. 2d. to 1s. 3d.

CREOSOTE.—B.S.I. Specification standard, 5¾d. to 6d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 4¾d. to 5½d. GLASGOW: B.S.I. Specification 5d. to 5½d. per gal.; washed oil, 4½d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4½d. to 1s. 5½d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £12 to £13 per ton; purified crystals, £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £7 10s. per ton (bags free).

PYRIDINE.—90/140%, 7s. 6d. to 9s. per gal.; 90/180, 2s. 3d. GLASGOW: 90% 140, 7s. to 8s. per gal.; 90% 160, 5s. to 6s.; 90% 180, 2s. 6d.

TOLUOL.—90%, 2s. per gal.; pure, 2s. 4d. GLASGOW: 90%, 120, 1s. 10d. to 1s. 11d. per gal.

PITCH.—Medium, soft, 35s. per ton, in bulk at makers' works. MANCHESTER: 32s. 6d. to 35s. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 30s. to 35s. per ton; in bulk for home trade, 32s. 6d.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d. GLASGOW: Commercial, 1s. 11d. to 2s. per gal.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9 per ton; grey, £10 10s. to £11. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

CHARCOAL.—£5 5s. to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £45 to £48 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £3 per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—In bags, £88 15s. per ton; in casks, £89 15s.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works in casks.

o-NITRANILINE.—3s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

Latest Oil Prices.—See page 489.

Forthcoming Events

LONDON.

Dec. 7.—Society of Chemical Industry. (London Section and Food Group). "Modern Developments in Research on Insecticides." Dr. F. Tattersfield and Dr. J. T. Martin. 8 p.m. Rooms of the Chemical Society, Burlington House, Piccadilly, London.

Dec. 8.—Royal Institution. "Chemical Messengers of the Body." Professor E. Mellanby. 5.15 p.m. 21 Albemarle Street, London.

Dec. 8.—British Association of Refrigeration. Symposium on "Moulds, Bacteria and Taint in Refrigerated Produce." 6.30 p.m. British Industries House Club, British Industries House, London.

Dec. 8.—Society of Chemical Industry. (Road and Building Materials Group). "The Design and Construction of Thin Carpets." Brig.-Gen. E. G. Wace. 8 p.m. Rooms of the Chemical Society, Burlington House, Piccadilly, London.

Dec. 8.—Pharmaceutical Society of Great Britain. "Splashes and What They Teach." (Illustrated by lantern slides, films and experiments). Professor Allan Ferguson. 8.30 p.m. 17 Bloomsbury Square, London.

Dec. 9.—Institute of Fuel. "The History and Development of Mond Gas for Industrial Purposes." H. A. Humphrey. 6 p.m. Rooms of the Chemical Society, Burlington House, Piccadilly, London.

Dec. 9.—Institute of the Plastics Industry. "What are the Present Limiting Factors in the Expansion of the Plastics Industry?" Rex Jones; "A Moulder's Comments," W. C. Waghorne; "A Mould Maker's Comments, J. J. Collings; "A Material Manufacturer's Comments," F. Heywood. British Industries House Club, British Industries House, London.

Dec. 9.—Royal Society of Arts. "Artificial Resins." H. V. Potter. 8 p.m. John Street, Adelphi, London.

Dec. 10.—Chemical Society. Sixth Liversidge Lecture. "Study of Transmutation in the Chemical Laboratory." Professor F. Paneth. 5.30 p.m. Institution of Mechanical Engineer, Storey's Gate, Westminster, London.

Dec. 10.—Institute of Vitreous Enamellers. (Southern Section). "Vitreous Enamel Practice in Germany." By Dr. Karmaus of Berlin, read by V. C. Faulkner. 8 p.m. British Industries House, London.

Dec. 11.—Physical Society. Ordinary Meeting. 5 p.m. Imperial College of Science and Technology, Imperial Institute Road, South Kensington, London.

Dec. 11.—Society of Dyers and Colourists. (London Section). "Miscellaneous Applications of Synthetic Dyestuffs." M. Hill. London.

BIRMINGHAM.

Dec. 7.—Chemical Society (Birmingham Section) and Birmingham University Chemical Society. "Infra Red Spectra and Molecular Structure." Dr. J. J. Fox. 5 p.m. Chemical Lecture Theatre, Edgbaston, Birmingham.

Dec. 10.—Institute of the Plastics Industry. (Birmingham Section). "Hot Water Heating of Platens and Moulds." Dr. Ing. Kruger. James Watt Memorial Institute, Birmingham.

HUDDERSFIELD.

Dec. 7.—Society of Dyers and Colourists (Huddersfield Section) and Huddersfield Textile Society. Huddersfield.

LIVERPOOL.

Dec. 10.—Institute of Chemistry. (Liverpool and North-Western Section). Social Evening. 7.30 p.m. Constitutional Club. India Buildings, Water Street, Liverpool.

MANCHESTER.

Dec. 7.—Institute of the Plastics Industry. (Manchester Section). "Moulding Engineering Equipment." W. Owen-Griffiths. College of Technology, Sackville Street, Manchester.

Dec. 9.—Institute of Fuel. (North-Western Section). "The Working of a Rheolaveur Washer and the Operating Results Obtained." R. G. Evans. 7 p.m. Engineers' Club, 17 Albert Square, Manchester.

Dec. 11.—Oil and Colour Chemists Association. (Manchester Section). Why do we use Synthetic Resin?" Dr. E. Fonrobert. 7 p.m. Reynolds Hall, College of Technology, Sackville Street, Manchester.

NEWCASTLE-UPON-TYNE.

Dec. 7.—Institution of Mechanical Engineers. "Cast Iron: Heat Treatment." J. G. Pearce. Newcastle-upon-Tyne.

SHEFFIELD

Dec. 11.—Institute of Metals. (Sheffield Local Section). "Wrought Nickel Silver Alloys." M. Cook. 7.30 p.m. Non-Ferrous Section of the Applied Science Department of the University, St. George's Square, Sheffield.

SWANSEA.

Dec. 8.—Institute of Metals. (Swansea Local Section). Film Display of Metallurgical Interest. 6.30 p.m. Y.M.C.A. Swansea.

YORK

Dec. 7.—Society of Chemical Industry (Yorkshire Section) and Hull Chemical and Engineering Society. "A Viscometer for Materials of Abnormal Fluidity." A. A. Clark and H. J. Hodsman. 6.45 p.m. Station Hotel, York.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

SAVILLE MARVEL AND CO., LTD., Manchester, oil, paint, etc., merchants. (M., 5/12/36.) November 20, £4,600 debentures, part of £5,000 already registered. *Nil. August 6, 1936.

TAYLORS (CASH CHEMISTS) MIDLAND, LTD., London, S.W. (M., 5/12/36.) November 23, £54,000 debenture, to Taylors (Cash Chemists) Trust, Ltd.; general charge. *£41,190. January 23, 1936.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

CHEESEMAN, H. S. H., 165 Tentelow Lane, Norwood Green, works chemist. (C.C., 5/12/36.) £12 17s. 10d. October 13.

MARCUS, JACOB SAML., 84 Amhurst Park, Stamford Hill, manufacturing chemist; Marcus, Harris, and Marcus Regina (wife), same address. (C.C., 5/12/36.) £17 17s. 9d. October 28.

PARNELL, — (male), 75 Collingwood Road, Haverton Hill, chemical worker. (C.C., 5/12/36.) £10 4s. 10d. November 3.

TURNER, SAMUEL, 27 Station Road, Langley, chemical worker; and CASHMORE, WM., 15 Brook Street, West Bromwich. (C.C., 5/12/36.) £39 4s. 9d. October 21.

Companies Winding-up Voluntarily

THE SLAG AND TAR MACADAM CO., LTD. (C.W.U.V., 5/12/36.) By special resolution, November 23, 1936. William G. Crane, Economac House, Dunstall Road, Wolverhampton, appointed liquidator.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Morocco.—An agent resident in Paris, who is also established at Rabat, wishes to represent in the Moroccan market United Kingdom exporters of soya oil.

Books Received

The Institute of Chemistry of Great Britain and Ireland: Register of Fellows, Associates and Students, 1936. London: The Institute of Chemistry. Pp. 433.